

XII. *Synopsis of British Hymenoptera. Anthophila; part II., Apidæ.* By EDWARD SAUNDERS, F.L.S.

[Read March 5th, 1884.]

PLATES V—XIII.

ACUTILINGUES.

Div. II.—1ST JOINT OF LABIAL PALPI MANY TIMES LONGER THAN APICAL.

- |      |     |   |                   |
|------|-----|---|-------------------|
| (2)  | 1.  | 2nd and 3rd joints of labial palpi subequal ..  | <i>Panurgus.</i>  |
| (1)  | 2.  | 3rd joint of labial palpi much shorter than 2nd.  |                   |
| (28) | 3.  | 2nd joint of labial palpi more than half as long as 1st.  |                   |
| (15) | 4.  | Basal joint of labial palpi longer than 2nd.  |                   |
| (8)  | 5.  | Anterior wings with two submarginal cells.  |                   |
| (7)  | 6.  | Species dull; tongue longer than the palpi; intermediate calcaria in ♀ very long and toothed like a saw .. .. . | <i>Rophites.</i>  |
| (6)  | 7.  | Species shining; tongue shorter than the palpi; intermediate calcaria in ♀ short and simple                     | <i>Dufourea.</i>  |
| (5)  | 8.  | Anterior wings with three submarginal cells.  |                   |
| (12) | 9.  | Maxillary palpi 6-jointed.  |                   |
| (11) | 10. | Abdomen short and subclavate, blue or metallic  | <i>Ceratina.</i>  |
| (10) | 11. | Abdomen subovate, pointed at the apex, brown or black with yellow markings .. .. .                              | <i>Nomada.</i>    |
| (9)  | 12. | Maxillary palpi with one or five joints.  |                   |
| (14) | 13. | Maxillary palpi with one joint only .. .. .   | <i>Epeolus.</i>   |
| (13) | 14. | Maxillary palpi with five joints .. .. .  | <i>Melecta.</i>   |
| (4)  | 15. | Basal joint of labial palpi shorter than 2nd.   |                   |
| (17) | 16. | Scutellum spined at the sides .. .. .   | <i>Calioxyys.</i> |
| (16) | 17. | Scutellum not spined.   |                   |
| (23) | 18. | Maxillary palpi 2-jointed.  |                   |
| (20) | 19. | ♂ with the apex of the abdomen not denticulated or emarginate; ♀ without a ventral brush ..                     | <i>Stelis.</i>    |
| (19) | 20. | ♂ with the apex of the abdomen denticulated or emarginate; ♀ with a ventral pollen brush.                       |                   |
| (22) | 21. | Abdomen with yellow markings .. .. .  | <i>Anthidium.</i> |
| (21) | 22. | Abdomen without yellow markings .. .. .   | <i>Megachile.</i> |
| (18) | 23. | Maxillary palpi 3- or 4-jointed.  |                   |
| (25) | 24. | Maxillary palpi 4-jointed .. .. .   | <i>Osmia.</i>     |

- (24) 25. Maxillary palpi 3-jointed.
- (27) 26. Apical joint of labial palpi much shorter than 3rd; 1st segment of abdomen not carinated at the base .. .. . *Chelostoma*.
- (26) 27. Apical and 3rd joints of labial palpi subequal; 1st segment of abdomen carinated at the base *Heriades*.
- (3) 28. 2nd joint of labial palpi not half so long as 1st.
- (30) 29. Anterior wings with two submarginal cells .. *Eucera*.
- (29) 30. Anterior wings with three submarginal cells.
- (32) 31. Maxillary palpi 6-jointed .. .. . *Anthophora*.
- (31) 32. Maxillary palpi with one, two, or four joints.
- (34) 33. Maxillary palpi with four joints .. .. . *Saropoda*.
- (33) 34. Maxillary palpi with one or two joints.
- (38) 35. Maxillary palpi 2-jointed.
- (37) 36. Mandibles of ♂ fringed with stiff curled hairs; posterior tibiæ of ♀ and ♂ concave and shining externally .. .. . *Bombus*.
- (36) 37. Mandibles of ♂ not fringed with stiff curled hairs; posterior tibiæ of ♀ convex and hairy *Psithyrus*.
- (35) 38. Maxillary palpi with one joint .. .. . *Apis*.

#### PANURGUS, *Panz.*

*Panz.*, *Krit. Revision*, Band ii., p. 209 (1806).

Wings with two submarginal cells; labial palpi 4-jointed; maxillary palpi 6-jointed; 2nd and 3rd joints of labial palpi subequal; ♂ with all the eight ventral segments of the abdomen exposed, the 7th largely emarginate, the 3rd narrow and andreniform; species black, shining, clothed with black hairs. Antennæ in the ♂ scarcely longer than in the ♀; base of the posterior tibiæ with a patella.

- (2) 1. Smaller; ♂ with a large blunt spine on the posterior femora; ♀ with the surface of the abdomen above nearly naked, and the scopæ dull brownish yellow .. .. . *calcaratus*.
- (1) 2. Larger; ♂ with the posterior femora simple; ♀ with the surface of the abdomen above rather densely clothed with upright hairs; scopæ bright golden .. .. . *ursinus*.

#### 1. *Panurgus calcaratus*, Scop. (Pl. V., fig. 2—2b).

Scop., *Ent. Carn.*, p. 301; Smith, *Cat. Brit. Hym.*, 2nd ed., p. 106.

Black, shining; antennæ fulvous towards the apex, rarely entirely black; posterior femora with a large blunt tooth beneath; ♀ with the scopæ dull ochreous yellow.

♂. Head somewhat round, wider than the thorax, shining, punctured, densely clothed with sooty black hairs; clypeus very deeply emarginate in front; labrum depressed in the centre and very highly polished, its sides hairy; antennæ slightly thickened towards the apex. Thorax shining, finely, remotely, and irregularly punctured, sparingly clothed with erect sooty black hairs; metathorax with its basal area finely and longitudinally wrinkled at the base. Abdomen subovate, shining, sparingly clothed with short suberect hairs; segments depressed at the apex, punctured at the base, apical fringe sooty brown; beneath with the 6th segment narrowly emarginate in the centre, the 7th scarcely visible, 8th produced, narrow, with its apex widened (for genitalia see Pl. V., figs. 2—2*b*). Legs clothed with pale hairs; posterior femora with a large truncate spine beneath; posterior tibiæ curved, thickened at the apex, with a tuft of long hairs above the middle, on their inner side.

♀. Very like the ♂, but with the head smaller, scarcely wider than the thorax. Metathorax with the basal area finely wrinkled and depressed; beyond it with the surface smooth, but not very shining. Abdomen oval, convex, very finely punctured, anal fimbria sooty brown, apical dorsal valve rugosely punctured, narrowly raised down the middle; beneath punctured, legs clothed with sooty brown hairs, posterior tibiæ with the scopæ greyish brown, although often covered with bright yellow pollen. Length, 7—8 mm.

*Hab.* Wandsworth, Blackheath, Chobham, Bournemouth, Hastings, Isle of Wight, S. Devon, Penzance, &c. Burrows in the ground on sandy and gravelly commons, &c.

## 2. *Panurgus ursinus*, Gmel. (Pl. V., fig. 1—1*b*).

Gmel., Linn. Syst. Nat., ed. xiii., p. 2790 = *Banksianus*, Kirb., Smith, Cat. Brit. Hym., 2nd ed. p. 107.

. Larger than the preceding; ♂ with the coxæ, femora, and tibiæ simple; ♀ with the scopæ bright golden.

♂. Black, clothed with black hairs. Head scarcely wider than the thorax, covered with sooty black hairs. Thorax shining, finely and remotely punctured; metathorax with its basal area bounded by a wide, smooth, and shining line. Abdomen clothed with black hairs; segments deeply impressed and glabrous at the apex and more or less piceous; apical fringe sooty black; genitalia testaceous (see Pl. V., figs. 1—1*b*); beneath with the 6th segment deeply emarginate; 7th foveated at the base, narrowed and slightly emarginate at the apex; 8th narrow and rounded at

the apex. Legs clothed with fulvous hairs; tarsi pale piceous, except the basal joint.

♀. Black, shining; head densely, thorax somewhat sparsely, clothed with black hairs; mesothorax finely and remotely punctured; metathorax smooth, with the basal area undefined. Abdomen subelliptic, sparsely clothed with rather long fine brown hairs, the apex of each segment impressed and somewhat piceous; apical fringe brown; beneath rather densely clothed with brown hairs, 5th segment largely emarginate at the apex. Legs clothed with golden hairs; posterior tibiæ and metatarsi, and the apices of all the tarsi, testaceous. Scopæ bright golden. Length, 9—10 mm.

*Hab.* A common species in many localities. London District; Chobham; Hastings; Bournemouth; Sidmouth; Barmouth, N. Wales; Norwich; &c. Burrows in the ground, and is chiefly found in sandy localities. Smith records *dentipes* as British on a single specimen in the collection of the British Museum. Should this species occur in this country it can easily be recognised by the spinose or dentate posterior trochanters and simple femora of the ♂, and by the highly polished surface of the metathorax of the ♀, the basal area of which is not longitudinally striate. It is of the same size as *calcaratus*.

#### ROPHITES, *Spin.*

*Spin.*, *Ins. Lig.*, ii., p. 9.

Species dull and pubescent, halictiform, but wings with two submarginal cells; labial palpi 4-jointed; maxillary palpi 6-jointed; tongue narrow and elongate, much longer than the palpi, reaching to the abdomen; ♂ with the 7th segment hidden, produced at each side into a long process; the 8th very narrow and long, widened and spoon-shaped at the apex, which is just visible beyond the 6th; posterior tibiæ with a patella at the base. Antennæ of ♂ considerably longer than those of the ♀.

#### 1. *Rophites quinquespinosus*, *Spin.* (*Pl. V.*, fig. 3—3*d.*)

*Spin.*, *Ins. Lig.*, ii., p. 72.

♀. Head black, clothed with brown hairs, very finely and closely punctured; face longer than wide. Antennæ reaching to the prothorax. Thorax black, very finely and closely punctured, and densely clothed with short brown hairs; tegulæ piceous; wings subhyaline, darker at the apex; metathorax dull, radiately striate at the base, closely punctured posteriorly. Abdomen dull, closely, finely, and evenly punctured, black, clothed with very

short hairs, the apical margin of each segment narrowly piceous, and clothed with a band of pale ochreous decumbent hairs, that of the basal segment interrupted, that of the 5th and 6th segments golden; 5th segment simple; 6th with the dorsal valve triangular, its margins narrowly raised; beneath punctured, apical margin of the segments pale and clothed with pale hairs. Legs clothed with golden hairs; intermediate calcaria very long and pale, inwardly serrate; apical joints of the tarsi testaceous. Length, 9 mm.

The ♂ has not yet occurred in this country, but may be at once recognised by its pale antennæ and the spines on its 6th ventral segment (for genitalia, &c., see Pl. V., figs. 3—3*d*).

*Hab.* Guestling, near Hastings. Two specimens taken by the Rev. E. N. Bloomfield, to whom I am greatly indebted for the specimen from which this description is drawn up. The ♀ very closely resembles an *Halictus*, but its wings, which have only two submarginal cells, its long narrow tongue, and simple 5th dorsal segment, *i.e.*, without the central rima, will at once distinguish it.

#### DUFOUREA, Lep.

Lepelletier, Hist. Nat. des Ins., Hym. ii., p. 226.

Very like a small *Panurgus*, but with the ♂ narrower than the ♀, and with longer antennæ; 3rd joint of labial palpi much shorter than 2nd; wings with two submarginal cells; six ventral segments and the tip of the 8th visible in the ♂; 7th ventral segment of the ♂ deeply cleft; 8th very narrow and elongate; species black and shining; posterior tibiæ with a patella.

1. *Dufourea vulgaris*, Schenck. (Pl. V., fig. 4—4*c*).

Schenck, Jahr. Ver. Nat. Herz. Nassau, xiv., p. 206.

Both sexes black and shining, calcaria pale, tarsi more or less piceous.

♂. Head shining, rugosely punctured, clothed with ochreous hairs; face nearly round. Antennæ reaching not quite to the tegulæ, entirely black; mandibles pitchy red. Thorax smooth and shining, remotely and irregularly punctured, sparingly clothed with ochreous hairs; wings subhyaline, nervures dark piceous; metathorax radiately wrinkled at the base, its brow semicircular. Abdomen elongate, shining, the segments remotely punctured at the base and sparsely clothed with ochreous hairs, glabrous and impunctate, and more or less impressed at the apex; apical dorsal

valve narrow and pale at the apex; beneath shining, punctured (for genitalia see Pl. V., figs. 4—4 c). Legs clothed with pale hairs; calcaria pale.

♀. Something like a very small *Panurgus* in shape. Head rather closely punctured; clypeus with a few very large shallow punctures, fringed in front with golden hairs; mandibles pitchy red. Thorax above very shining and almost glabrous, very remotely punctured, more hairy round the sides; wings as in the ♂; metathorax finely rugose. Abdomen somewhat depressed and sub-elliptic, the segments sparsely punctured and clothed with pale hairs at the base, very shining and glabrous, and somewhat piceous and impressed at the apex; apical fringe brown; 6th dorsal valve piceous; beneath with the segments punctured at their apex, and clothed with pale hairs, their apical margins pale; 5th with a transverse carina; 6th testaceous. Legs with pale hairs. Length, 6—7 mm.

*Hab.* Undercliff near Chewton, Hants. One ♂, Aug. 12th, 1879, Sir S. S. Saunders; Woking, Aug. 1st, 1881, one ♀, Mr. T. R. Billups, who has very generously presented me with the specimen. These are the only recorded captures of this species in England.

#### NOMADA, *Fabr.*

*Fabr.*, *Syst. Ent.*, p. 388.

Wings with three submarginal cells; labial palpi 4-jointed; maxillary palpi 6-jointed; ♂ with the clypeus densely hairy, and with the 8th abdominal ventral segment produced at the apex into a somewhat elongate curved process, spinose or hairy at the sides, and generally terminating in two recurved teeth or spines; 7th ventral, shaped like the 6th; only six ventral segments exposed; genital armature with the cardo very large, and with the apices of the laciniae generally very densely tufted with hairs; ♀ with the 6th ventral segment flat and truncate, armed at each side of the truncature with several thick curved spines.

A genus of elegantly-shaped bees, generally banded on the abdomen with yellow and brown or black, so as somewhat to resemble a wasp. The species, so far as we know, are all parasitic on other Hymenoptera.

(32) 1. Labrum pale, or with only slightly darker spots;  
species not very small.

(3) 2. Metathorax posteriorly bright and shining at the  
sides .. .. . *Roberjeotiana*.

- (2) 3. Metathorax posteriorly not bright and shining at the sides.
- (7) 4. Scutellum not raised, entirely flavous, or with a single flavous spot in the middle.
- (6) 5. Abdomen with lateral spots; antennæ dark .. *solidaginis*.
- (5) 6. Abdomen with continuous bands; antennæ pale *fucata*.
- (4) 7. Scutellum more or less raised, with two reddish or flavous spots; or entirely immaculate.
- (17) 8. Markings of 2nd and following abdominal segments black and yellow, sharply defined.
- (10) 9. Head somewhat rostrate; the portion in front of the eyes, viewed sideways, much longer than that behind them .. .. . *6-fasciata*.
- (9) 10. Head not rostrate; viewed sideways, with its anterior portion not longer than the posterior.
- (12) 11. Abdominal bands, with the exception of the 1st, entire; apex of the posterior tibiæ in the ♀ armed outwardly with two thick curved spines *succincta*.
- (11) 12. One or more of the abdominal bands, besides the 1st, interrupted; posterior tibiæ in the ♀ at the apex outwardly unarmed or with several fine spines.
- (14) 13. ♂, antennæ short, almost entirely black; 2nd and 3rd joints of flagellum subequal; scutellum with two large conspicuous yellow spots; ♀, antennæ dark; posterior tibiæ unarmed .. *jacobææ*.
- (13) 14. ♂, antennæ long, only dark above at the base; 2nd joint of flagellum not so long as 3rd; spots of scutellum small, if any; ♀, antennæ pale; posterior tibiæ armed outwardly with fine spines.
- (16) 15. Tegulæ flavous; 3rd joint of the antennæ in the ♂, looked at from beneath, not half so long as the 4th; 3rd joint of the antennæ in the ♀ much shorter than the 4th .. .. . *lincola*.
- (15) 16. Tegulæ almost always ferruginous; 3rd joint of antennæ in the ♂ beneath more than half the length of the 4th; 3rd in the ♀ almost as long as the 4th .. .. . *alternata*.
- (8) 17. Markings of abdomen brown and yellow, or, if black, then with the black margined with brown.
- (19) 18. ♂ with the joints of the antennæ tuberculated beneath; ♀ with the tubercles of the prothorax and two spots on the scutellum flavous; the pubescence of the thorax bright fulvous-red *Lathburiana*.
- (18) 19. ♂ with the antennæ simple; ♀ with the spots on the scutellum not flavous; pubescence of the thorax not bright fulvous-red.
- (29) 20. Mandibles acute at the apex.
- (22) 21. Markings of abdomen cream-coloured or nearly white on a clear brownish red ground; posterior tibiæ in both sexes with five long equal spines, pale in the ♂, black in the ♀ .. *albuguttata*

- (21) 22. Markings of abdomen yellow on a brown ground ; posterior tibiæ often spined, but the spines unequal and irregular, or short and stout.
- (24) 23. Apex of posterior tibiæ in the ♀ with three short thick spines .. .. . *guttulata.*
- (23) 24. Apex of posterior tibiæ in ♀ with long irregular pale spines.
- (28) 25. Scape of the antennæ entirely black in the ♂ : mesothorax entirely black in the ♀ .
- (27) 26. Prothoracic tubercles entirely flavous in the ♀ ; margined with flavous in the ♂ .. .. . *lateralis.*
- (26) 27. Prothoracic tubercles ferruginous in both sexes *borealis.*
- (25) 28. Scape of antennæ flavous beneath in the ♂ ; mesothorax in the ♀ more or less striped with red .. .. . *ruficornis.*
- (20) 29. Mandibles bifid or truncate at the apex.
- (31) 30. Mandibles bifid .. .. . *bifida.*
- (30) 31. Mandibles simply truncate .. .. . *ochrostoma.*
- (1) 32. Labrum black, or species very small (*furva*).
- (34) 33. Head without a sharp keel between the antennæ *obtusifrons.*
- (33) 34. Head with a sharp keel between the antennæ.
- (36) 35. ♂, anterior femora flattened and dilated ; ♀ with an elevated tooth on the labrum ; species large .. .. . *armata.*
- (35) 36. ♂ anterior femora simple ; ♀ labrum simple.
- (42) 37. Labrum black.
- (39) 38. ♂ with the 3rd, 4th, and 5th joints of the flagellum somewhat swollen, the 5th to the 9th with a small tubercle beneath ; ♀ antennæ short ; 2nd and 3rd joints of flagellum sub-equal .. .. . *ferruginata.*
- (38) 39. ♂ antennæ simple ; ♀ antennæ long ; 3rd joint of flagellum much longer than 2nd.
- (41) 40. ♂ face entirely black ; ♀ antennæ with a wide black band below the apex .. .. . *Fabriciana.*
- (40) 41. ♂ face at the sides above the mandibles, clypeus, and mandibles, flavous ; ♀ antennæ entirely pale .. .. . *flavoguttata.*
- (37) 42. Very small species ; labrum pale .. .. . *furva.*

1. *Nomada fucata*, Panz. (Pl. VI., figs. 3—3b).

Panz., Faun. Germ., 55, 19 = *varia*, Panz., Smith, Cat. Brit. Hym., 2nd ed., p. 119.

Black. Antennæ clear rufo-testaceous, those of the ♂ with a black spot on the 7th and 8th joints above. Thorax with flavous markings ; scutellum with a single central spot. Abdomen banded with yellow ; basal segment brownish red on the disk.

♂. Head and thorax black, clothed with pale hairs, dull, largely and rugosely punctured ; mandibles, labrum and clypeus, clothed with silvery hairs, the sides of the face above the mandibles



yellow; mandibles short, curved, and pointed, their apices piceous. Antennæ clear rufo-testaceous; scape flavous in front; 2nd joint of the flagellum slightly shorter than the 3rd; 6th and 7th joints of the flagellum, and sometimes the 8th, with a black spot above. Thorax with two spots on the collar; the tubercles, tegulæ, and a spot on the mesopleuræ in front, flavous; wings with the nervures testaceous; scutellum entirely, or with a central spot, flavous. Abdomen finely punctured, black; basal segment with a brownish red central band; each of the others with a yellow band, slightly narrowed in the middle; apical dorsal valve deeply incised; beneath punctured and banded with yellow; 6th segment densely ciliated with hairs at the apex; 7th flattened and narrowed towards the apex, which is truncate; 8th narrow and recurved at the apex, with several spines pointing backwards from the apex, and a few smaller ones on the sides pointing forwards towards it (for genitalia, &c., see Pl. VI., figs. 3—3b). Legs testaceous; femora at the base black.

♀. Very like the ♂, but with the antennæ of a deeper colour, and not spotted above; the scape concolorous; markings of the face of a deeper colour, more inclining to testaceous, clypeus not hairy; markings of the thorax and abdomen as in the ♂; 5th segment beneath with an apical fringe of thick stiff recurved hairs; 6th flat and truncate at the apex, the sides near the apex with thick curved testaceous spines. Legs as in the ♂. Length, 10—12 mm.

*Hab.* Darenth; Hastings, parasitic on *Andrena fulvicrus*, August, 1879; Eastbourne; Sandown Bay, Isle of Wight. F. Smith says that it is parasitic on *Halictus rubicundus* and *leucozonius*.

This species may be at once recognised by the brown basal segment of its abdomen and the single spot on the scutellum.

## 2. *Nomada solidaginis*, Panz. (Pl. VI., figs. 2—2b).

Panz., Faun. Germ., 72, 21; Smith, Cat. Brit. Hym., 2nd ed., p. 127.

Black. Abdomen sometimes brown. Thorax with yellow markings; scutellum with a single yellow spot; abdomen with yellow lateral spots on the 2nd and 3rd segments, and entire bands on the following.

♂. Head and thorax black, largely and closely punctured, clothed with short pale hairs; mandibles, labrum, clypeus, and face at the sides of the clypeus, flavous; mandibles short and pointed, piceous towards the apex. Antennæ short; scape flavous beneath; flagellum piceous beneath, black above, its 2nd joint as

long or longer than the 3rd and following joints, transverse. Thorax with two spots on the collar, the tubercles, tegulæ, and an oval spot on the mesopleuræ, flavous; wings dusky, nervures pitchy; scutellum with a single flavous spot. Abdomen black or rarely brown, shining, finely punctured, except at the extreme apex of each segment; 1st segment immaculate, 2nd and 3rd with a large yellow spot on each side, 4th with an entire yellow band, and 5th and 6th almost entirely yellow; 7th black, rounded at the apex; beneath black, shining, and punctured, except at the apex of each segment; 7th segment smooth and convex, and narrowly rounded at the apex; 8th shaped much like the 7th, but flatter, and armed at the apex on each side with a long upcurved spine and several shorter ones along the sides of the segment (for genitalia, &c., see Pl. VI., figs. 2—2*b*). Legs testaceous-red, flavous at the knees; posterior femora black at the base; posterior coxæ with a yellow spot.

♀. Very like the ♂, but with the ground colour of the abdomen often brown, the labrum and scape of the antennæ ferruginous, the clypeus not hairy and of a more ferruginous colour, the mandibles flavous only at the base, the thorax and abdomen coloured as in the ♂; 5th ventral segment with a fringe of strong black curved hairs on each side at the apex; 6th flat and impressed in the centre, truncate at the apex, with three or four curved spines at each side of the truncature. Legs coloured much as in the ♂, but posterior femora with only a black stripe on their inner surface. Length, 8—9 mm.

*Hab.* Common on *Senecio*, &c., in July and August, and widely distributed. F. Smith says that it is parasitic on *Halictus leucozonius*, and probably also on *H. cylindricus*.

This little species can hardly be confounded with any other; it is most like *Jacobææ*, but its single spotted scutellum will distinguish it at once.

### 3. *Nomada sexfasciata*, Panz. (Pl. VI., figs. 4—4*b*).

Panz., Faun. Germ., 62, 18; Smith, Cat. Brit. Hym., 2nd ed., p. 130.

Black; clypeus produced so as to give the head a rostrate appearance; mouth, tegulæ, and two spots on the scutellum, an interrupted band on the first three segments of the abdomen, and an entire band on the others, yellow; legs yellow in the ♂, testaceous in the ♀.

♂. Head and thorax dull, closely and rugosely punctured, rather densely clothed with brownish grey hairs; the portion in

front of the eyes more produced than in the other species of the genus; this is caused partly by the greater length of the cheeks from the eye to the clypeus, and partly by the length of the clypeus itself; mandibles pointed at the apex, not nearly touching the eyes, flavous, with their apices piceous; labrum and clypeus flavous, the latter with a triangular black patch at the base; sides of the face below the antennæ flavous; face below the antennæ densely clothed with silvery hairs. Antennæ fulvous, the scape beneath flavous, above black; the flagellum black above as far as the 6th joint; 3rd joint only a trifle shorter than the 2nd. Thorax entirely black, except the yellow margins of the tegulæ; wings with piceous nervures; scutellum with two small yellow spots or spotless. Abdomen black, finely punctured; 1st, 2nd, and 3rd segments each with a large lateral yellow spot; 4th, 5th, and 6th with a continuous band; apical dorsal valve almost entire; 6th and 7th segments clothed with golden hairs; beneath with the segments densely fringed at the apex with golden hairs; 3rd, 4th, and 5th segments yellow at the base; 6th at the apex, and densely clothed with golden hairs on the yellow portion; 7th segment narrowly rounded; 8th with a long apical projection, strongly curved, and with a few long hairs on each side of the apex; also with its basal portion clothed with long hairs in front (for genitalia, &c., see Pl. VI., figs. 4—4b). Legs yellow; posterior and intermediate femora black beneath.

♀. Very like the ♂, but more shining, and with brighter markings. Head and thorax clothed with fulvous golden hairs; markings of the face as in the ♂, but of a deeper yellow; scape of the antennæ fulvous in front; flagellum fulvous, slightly darker towards the apex. Thorax as in the ♂, but the tegulæ nearly entirely yellow; scutellum with two large yellow spots. Abdomen spotted and banded as in the ♂; segments beneath not fringed at the apex; 5th with a tuft of golden hairs on each side; 6th smooth and truncate at the apex, with several curved spines on each side of the truncature. Legs fulvous; femora black at the base. Length, 13—15 mm.

*Hab.* Parasitic on *Eucera longicornis*, and not rare in many localities in May and June; near Highgate; Southgate; Southend; Norwich; Chobham; Hastings, one ♀ in August, 1879.

Easily recognised by its large size and subrostrate head.

4. *Nomada succincta*, Panz. (Pl. VI., figs. 9—9 b).

Panz., Faun. Germ., 55, 21; Smith, Cat. Brit. Hym., 2nd ed., p. 132.

Tegulæ and tubercles, and two spots on the scutellum (often absent in the ♂), flavous; abdomen with entire flavous bands on all the segments, except the basal one; posterior tibiæ in the ♀ armed outwardly with two thick curved pale spines.

♂. Black; head and thorax densely and rugosely punctured, densely clothed with brownish grey hairs; mandibles flavous, thick, pointed, and carinated down the middle, flavous, with the apex piceous; labrum, clypeus, except the extreme base, sides of the face below the antennæ, and scape of the antennæ in front, flavous. Antennæ fulvous, black above as far as the 8th joint. Thorax with two spots on the collar; the tubercles and tegulæ citron-yellow; mesopleuræ with a yellow anterior margin; wings with testaceous nervures; scutellum with two small yellow spots. Abdomen finely punctured; basal segment with an interrupted yellow band; the following five each with a continuous band of the same colour; apical dorsal segment sharply emarginate, sparingly clothed with golden hairs; beneath shining, punctured, except at the apex of each segment; 2nd, 3rd, 4th, and 5th with a central yellow band; 6th segment yellow at the apex; 7th smooth, narrowly rounded at the apex; 8th with a long narrow apical production, its extremity curved upwards, and armed on each side with many long spines, those towards the apex longest (for genitalia, &c., see Pl. VI., figs. 9—9 b). Legs fulvous-yellow, with paler markings; femora posteriorly black; posterior tibiæ somewhat truncate at the apex and unarmed, with a slight tubercle on the inner angle of the truncature; posterior trochanters densely hairy beneath.

♀. Very like the ♂, but with the mandibles pale piceous; the labrum piceous, black on the disk; clypeus black, piceous at the extreme apical margin. Antennæ entirely fulvous. Thorax as in the ♂, but less hairy; the spots of the scutellum larger, and the metathorax often with a spot on each side. Abdomen coloured as in the ♂; 5th segment beneath with a tuft of long brownish hairs on each side; 6th somewhat truncate, with curved spines on each side. Legs fulvous; femora black at the base; posterior tibiæ outwardly armed with two or three thick, much curved, piceous spines. Length, 11—13 mm.

*Hab.* Generally distributed and common in April. I have taken it as late as June.

5. *Nomada lineola*, Panz. (Pl. VI., figs. 5—5 b).

Panz., Faun. Germ., 53, 23; Smith, Cat. Brit. Hym., 2nd ed., p. 129.

Antennæ rufo-testaceous, dark at the base above in the ♂, their joints longer than wide; 2nd joint of the flagellum in the ♂ not nearly half as long as the 3rd; in the ♀ about half as long as the 3rd; tegulæ, tubercles, and two spots on the scutellum (often absent in the ♂), citron-yellow. Abdomen with interrupted flavous bands.

♂. Very like the preceding species in colour, except as regards the interruption of the 2nd and 3rd abdominal bands, and, although this character will always serve to distinguish it, the following points of structure can be more safely relied upon: the 2nd joint of the flagellum is much shorter in proportion to the 3rd, and, looked at from beneath, is not nearly half its length; the apical portion of the 8th abdominal segment is slenderer, and the sides near the apex are armed with finer paler spines (for genitalia, &c., see Pl. VI., figs. 5—5 b); the posterior coxæ are less densely hairy, and the tibiæ are armed at the apex with fine long spines.

♀. Differs from that of *succincta* in the same points of coloration as the ♂, but it wants the yellow line at the sides of the face so characteristic of ♀ *succincta*; structurally it may be distinguished at once by the 2nd joint of the flagellum of the antennæ being scarcely more than half so long as the 3rd, and by the posterior tibiæ being armed at the apex outwardly with numerous dark spines. Length, 10—13 mm.

*Hab.* Generally distributed, and not uncommon in April and May. Parasitic on various spring species of *Andrena*.

This species is very variable in the extent of the yellow colour; sometimes the basal segment of the abdomen is banded with yellow, sometimes with red; sometimes the bands of the 2nd and 3rd segments are widely interrupted, sometimes almost entire; in fact very little dependence can be placed on the coloration for specific characters; still, in all its varieties, the species may be recognised without failure by careful observation of the points of structure enumerated above.

6. *Nomada alternata*, Kirb. (Pl. VI., figs. 6—6*b*).

Kirb., Mon. Ap. Angl., ii., p. 182 = *Marshamella*, Kirb.; Smith, Cat. Brit. Hym., 2nd ed., p. 131.

Antennæ coloured as in the last species, its joints longer than wide; 2nd joint of flagellum in the ♂ half or more than half the length of the 3rd; in the ♀ about the same length as the 3rd; tegulæ testaceous-brown; tubercles generally more or less flavous; two spots on the scutellum (often wanting in the ♂) flavous. Abdomen with interrupted flavous bands; apical spines of the posterior tibiæ in the ♀ pale.

♂. Only differs from the preceding by the longer 2nd joint of the flagellum and the shorter 3rd, and by the testaceous, not flavous, tegulæ, and by usually having a black streak on the tibiæ posteriorly (for genitalia, &c., see Pl. VI., figs. 6—6*b*).

♀. Differs from the preceding by the longer 2nd joint of the flagellum, the testaceous tegulæ, and the pale spines of the posterior tibiæ. Length, 10—13 mm.

Very variable, like the preceding species, in the extent of the yellow markings.

*Hab.* Generally distributed, and common in April and May. Parasitic on *Andrena nigroænea* and *atriceps*; and F. Smith says he has observed it in the burrows of *Eucera*.

7. *Nomada jacobææ*, Panz. (Pl. VI., figs. 8—8*b*).

Panz., Faun. Germ., 72, 20; Smith, Cat. Brit. Hym., 2nd ed., p. 128.

A shorter and more compact insect than either of the preceding. Antennæ with the flagellum almost entirely black in both sexes, its joints as wide, or nearly as wide, as long; 2nd and 3rd joints in the ♂ subequal; 3rd in the ♀ distinctly shorter than the 2nd; tegulæ, tubercles, and scutellar spots very prominent and flavous. Abdomen with interrupted bands; posterior tibiæ outwardly unarmed.

♂. Head and thorax black, almost glabrous, largely and densely punctured; mandibles, except the piceous apices, labrum, clypeus, except the extreme base, and face at the sides of the clypeus, flavous; face below the antennæ clothed with silvery hairs. Antennæ short, black above throughout their length; scape flavous beneath; flagellum piceous beneath, its 2nd and 3rd joints subequal; prothorax with the collar and tubercles, mesothorax with the tegulæ, and a round spot on each of the mesopleuræ

beneath, flavous; wings smoky; 1st transverse median nervure uniting with the cubital at the base of the furcature; scutellum with two large yellow spots. Abdomen finely punctured, somewhat shining, with an almost entire band on the 1st segment, a widely interrupted band on the 2nd and 3rd, and an entire band on the 4th, 5th, and 6th flavous; apical dorsal valve black: beneath black; 3rd, 4th, and 5th segments widely flavous at the base, their apical margins shining and impunctate; 6th densely hairy in the centre; 7th smooth and shining; 8th with the central process very long, not widened at the apex, armed on each side just below the apex with a very large strong spine, the sides of the process below it fringed with hairs (for genitalia see Pl. VI., figs. 8—8*b*). Legs clear orange-testaceous; coxæ, trochanters, and the posterior femora at the base, black; posterior tibiæ outwardly unarmed.

♀. Very like the ♂ in colour, but with the mandibles, labrum, clypeus, and scape testaceous, not flavous; the antennæ with the 2nd joint of the flagellum longer than the 3rd; the metathorax with a small flavous spot on each side; apical dorsal valve testaceous-brown; 5th segment beneath densely clothed with hairs at the sides of the apex; 6th with lateral spines. Legs as in the ♂; posterior tibiæ unarmed. Length, 10—12 mm.

*Hab.* On *Senecio* in July and August; not very common, but widely distributed.

8. *Nomada Lathburiana*, Kirb. (Pl. VII., figs. 5—5*b*).

Kirb., Mon. Ap. Angl., ii., p. 183; Smith, Cat. Brit. Hym., 2nd ed., p. 117.

Abdomen in both sexes with continuous yellow bands, its base brown; ♂ with the joints of the antennæ, except the four at the base, with a small grain-like tubercle beneath on each; ♀ with the pubescence of the thorax red.

♂. Head and thorax black, clothed with ochreous hairs; mandibles yellow, simple, their apices brown; labrum, clypeus, a spot above it, sides of the face, and scape of the antennæ in front, yellow. Antennæ fulvous, with the first six or seven joints black above; the 5th to the 13th bearing beneath a small grain-like tubercle on each. Thorax largely and very closely punctured; tubercles yellow; tegulæ testaceous; wings slightly brownish, nervures testaceous. Abdomen brownish black; the basal segment with a paler brown band across the middle; the remaining segments with a wide yellow basal band on each; 8th segment with the central process only slightly widened at the apex, the sides with rather long somewhat reflexed hairs (for genitalia, &c., see Pl. VII., figs. 5—5*b*). Legs fulvous; femora black beneath.

♀. Larger than the ♂, with the parts of the face which are yellow in the ♂ fulvous-red. Antennæ simple, entirely fulvous, except the basal joint, which is black above. Thorax clothed with short reddish hairs; tubercles yellow; tegulæ testaceous; scutellum with two yellow tubercles. Abdomen coloured as in the ♂; legs fulvous-red; posterior femora black; posterior tibiæ armed at the apex with a short blunt tooth, and two or three short thick pale spines. Length, 11—13 mm.

*Hab.* Hampstead, Highgate, Scotland, Devonshire.

F. Smith says it has been observed about the burrows of *Andrena labialis*, and also those of "*A. rufa*" (? *A. fulva*). Schmiedeknecht, in his 'Apidæ Europææ,' says it is parasitic on *Andrena pratensis*; so that probably, as Smith remarks, it is one of those bees that are parasitic on several species.

9. *Nomada alboguttata*, H.-Schäff. (Pl. VI., figs. 7.—7 b).

H.-Schäff., Germ. Zeitsch., i., p. 282 = *baccata*, Smith, Cat. Brit. Hym., 2nd ed., p. 120.

2nd joint of the flagellum in the ♂ much shorter than the 3rd; 2nd and 3rd in the ♀ subequal. Mesothorax entirely black in the ♂, in the ♀ with red vittæ. Abdomen bright rufo-testaceous, with cream-coloured lateral spots; posterior tibiæ in the ♂ with five long pale spines; in the ♀ with five black ones, all of about equal length.

♂. Head and thorax black, largely and rugosely punctured, clothed with long grey hairs; mandibles rather stout, flavous, and pointed, their points piceous; labrum pale flavous, densely clothed with long silvery hairs, its sides and the clypeus flavous. Antennæ with the scape flavous in front; flagellum rufo-testaceous, its first four or five joints black above; 3rd joint of flagellum much longer than the 2nd. Thorax with the tubercles, at least in front, flavous; tegulæ testaceous; mesopleuræ clothed with long white hairs, with a small yellow spot on each in front; wings slightly dusky; scutellum with two yellow spots more or less bordered with orange. Abdomen bright rufo-testaceous, each segment more or less black at the apex laterally; base of the 1st segment black; disk generally with two yellow spots; 2nd with a large lateral cream-coloured spot on each side at the base; 3rd, 4th, and 5th with smaller spots; 6th with a central spot; apical dorsal valve clothed with long pale hairs, its apex narrowly emarginate; beneath entirely rufo-testaceous, shining; 5th segment densely hairy; 3rd and 4th segments sometimes with a pale line in the middle; 8th segment



with the apical process winged on each side nearly to its apex, which is widened and armed on each side with fine pale spines (for genitalia see Pl. VI., figs. 7—7*b*). Legs rufo-testaceous; intermediate and posterior femora black at the extreme base; posterior tibiæ armed outwardly at the apex with five long nearly equal pale spines.

♀. Rather darker than the ♂; mandibles, clypeus, sides of the face, and antennæ rufo-testaceous; 2nd and 3rd joints of flagellum subequal; prothorax and tubercles testaceous; mesothorax with a rufo-testaceous vitta at each side, and two others down its disk; mesopleuræ with a large rufo-testaceous spot; tegulæ testaceous; scutellum testaceous; metathorax with two small rufo-testaceous spots at the base in the basal enclosure, and two larger ones below, its sides clothed with shining silvery hairs. Abdomen bright rufo-testaceous, black at the extreme base; each segment slightly darker towards the apex; a large spot on each side of the 2nd segment, a smaller one on each side of the 3rd, a transverse narrow spot on each side of the 4th, almost extending to the centre, and a square spot on the 5th, cream-coloured; beneath rufo-testaceous. Legs rufo-testaceous; femora at the extreme base more or less black; posterior tibiæ armed at the apex outwardly with five equally long curved black spines. Length, 7—9 mm.

*Hab.* On heaths, and parasitic on *Andrena argentata*. Woking, Sandhurst, Farnborough, Bournemouth, &c.

This species varies considerably in the extent of the testaceous colour. On the Continent a large form of it is known, the *5-spinosa* of Thomson; but, so far as I know, the small form only has hitherto occurred in this country.

#### 10. *Nomada guttulata*, Schenck.

Schenck, Jahr. Ver. Herz. Nassau, xiv., p. 388 = *rufilabris*, Thoms.

I have only a single ♀ of this species without locality, and therefore I introduce it with some hesitation; it would naturally pass as a small *ochrostoma*, but the mandibles are sharp at the apex, and the posterior tibiæ have outwardly three very short blunt spines, a character quite peculiar to itself; the 2nd and 3rd joints of the flagellum of the antennæ are subequal.

Thomson finds this species in Sweden, and has described it under the name of *rufilabris*.

11. *Nomada lateralis*, Panz. (Pl. VI., figs. 10—10*b*).

Panz., Faun. Germ., 96, 20, 21 = *xanthosticta*, Kirb., Smith, Cat. Brit. Hym., 1st ed. (nec 2nd) = *Bridgmaniana*, Smith, Cat. Brit. Hym., 2nd ed., p. 115.

Black; thorax without red vittæ in either sex; tubercles entirely flavous, or flavous in front only; scape of the antennæ in the ♂ entirely black. Abdomen brown, with yellow lateral spots or transverse bands, in the ♀ with a round yellow spot on each side of the 2nd segment.

♂. Head and thorax black, closely and rugosely punctured, clothed with short grey hairs; mandibles, except the extreme piceous apex, labrum, clypeus in front, and the sides of the face, flavous; face below the antennæ clothed with long silvery hairs. Antennæ with the scape entirely black; the flagellum piceous beneath, black above; 3rd joint much longer than 2nd. Prothorax with the tubercles widely bordered with yellow in front; mesothorax with the tegulæ testaceous; wings very slightly dusky. Abdomen testaceous-brown, shining, extreme base black; 1st segment unspotted, or with a yellow band; 2nd and 3rd segments with large lateral yellow spots, sometimes united into transverse bands; 5th and 6th segments each with a narrow basal yellow band, sometimes interrupted in the middle; 7th segment truncate at the apex, the truncature slightly emarginate; beneath brown, sometimes banded with yellow; 8th segment very narrowly produced, and curved upwards at the apex, the sides of the process finely fringed with hairs; apex with two strong reflexed spines (for genitalia see Pl. VI., figs. 10—10*b*). Legs black; femora and tibiæ in front pale; tarsi piceous; 1st joint more or less black above.

♀. Head and thorax black, rugosely punctured, clothed with short greyish brown hairs; mandibles, labrum, and clypeus in front testaceous, the labrum with a darker spot on each side; face below the antennæ with scattered bristly hairs. Antennæ with the scape black, the flagellum ferruginous, black above at the base; 2nd joint much shorter than 3rd. Prothorax with the tubercles flavous; mesothorax with the tegulæ piceous; scutellum with two obscure ferruginous spots. Abdomen pitchy brown, the extreme base black; apical margin of the basal segment narrowly dark, an ovate yellow spot on each side of the 2nd segment, and often with a smaller one on each side of the 3rd; sometimes also with a spot on the 5th. Legs with the femora black, except at their extreme apices; tibiæ ferruginous, with a black vitta posteriorly; posterior tibiæ armed outwardly with five rather short piceous spines; tarsi

ferruginous, their basal joints more or less black above. Length, 8—9 mm.

*Hab.* Norwich; Yorkshire; Newcastle.

The yellow tubercles distinguish this species at once from *ruficornis* and its allies; the male may be known besides by its black scape.

12. *Nomada ruficornis*, Linn. (Pl. VII., figs. 2—2 *b*).

Linn., Syst. Nat., ed. x., i., p. 578; Smith, Cat. Brit. Hym., 2nd ed., p. 110 = *lateralis*, Sm. pars ?

Var. = *signata*, Jur., Smith, &c.

Mandibles acute; scape of antennæ in the ♂ flavous in front. Thorax with red lines in the ♀, the tegulæ and tubercles piceous, sometimes ochraceous in the ♂. Abdomen bright brown, with yellow lateral spots or continuous bands; femora scarcely hairy outwardly in the ♀; posterior tibiæ armed outwardly with pale spines of uneven length.

♂. Head and thorax black, closely punctured, and densely clothed with brownish grey hairs; mandibles, labrum, clypeus, and face at its sides, flavous; mandibles acute, their tips piceous; face in front of the antennæ clothed with silvery hairs. Antennæ with the scape black, flavous in front; flagellum narrowly black above, beneath fulvous; 2nd joint about half as long as the 3rd. Thorax with the tubercles testaceous or ochraceous; tegulæ testaceous or piceous; wings slightly clouded, especially at the apical margin; scutellum with two red spots, or unspotted. Abdomen shining and finely punctured, black at the extreme base; basal segment beyond the black base generally entirely brown or with two black spots on the disk; the remaining segments brown, either with lateral yellow spots or with continuous yellow bands, the brown colour often deepened almost into black along the margins of the segments; beneath brown, with yellow bands; 8th segment with the apical process much curved, not widened at the apex, and finely fringed at the sides with hairs, and with two strong reflexed apical spines (for genitalia see Pl. VII., figs. 2—2 *b*). Legs ferruginous, the base of the femora more or less black; posterior tibiæ armed at the apex outwardly with fine spines of uneven length.

♀. Head and thorax black, clothed with short brownish hairs, the former with the mandibles, clypeus, labrum, and sides of the face fulvous. Antennæ fulvous, with the 2nd joint of the flagellum about three-fourths the length of the 3rd. Thorax almost entirely black, or black with narrow or broad red longitudinal stripes, or red with only indications of the darker lines; tubercles and tegulæ

testaceous; scutellum fulvous; mesopleuræ with a large red spot; metathorax unspotted, or with red spots, or (var. *signata*) with two large yellow spots. Abdomen shining, brown, spotted or banded with yellow, the extreme base of the 1st segment black, and often with the margins of all the segments more or less black; the extent of the yellow colour varies from a single round spot on each side of the 2nd segment, and a square spot on the 5th, to a complete yellow band on each segment; beneath the colour varies from uniform brown to brown with an entire band on each segment; 5th ventral segment with a tuft of black hairs on each side; 6th flat, truncate at the apex, the sides of the truncature with curved spines. Legs fulvous, the base of the femora black; posterior tibiæ armed outwardly with pale spines of irregular length. Length, 7—13 mm.

*Hab.* Common and generally distributed, April to July.

I have only described this species in general terms, not specifying all the varieties, as, with the exception of the var. with the entire bands, "*signata*," they are in no way constant, and merge into one another almost imperceptibly. One of the prettiest varieties is that where the apex of each segment is bordered with black, and the yellow spots well defined.

### 13. *Nomada borealis*, Zett.

Zett., *Ins. Lapp.*, p. 470; Smith, *Cat. Brit. Hym.*, 2nd ed., p. 112.

Closely allied to *ruficornis*. Mandibles acute; scape of the antennæ and mesothorax entirely black in both sexes; tubercles and tegulæ piceous. Abdomen dark brown, with yellow lateral spots, the brown colour much suffused with black; femora in the ♀ clothed with prominent black hairs outwardly.

♂. Differs from that of *ruficornis* in having the scape of the antennæ entirely black, the clypeus with only the margin pale, and the pubescence generally composed of thicker hairs, and in having the posterior femora outwardly more densely hairy.

♀. Differs from *ruficornis* in having the mesothorax without red lines, the brown colour of the abdomen darker and more suffused with black, and the posterior femora outwardly clothed with bristly black hairs. Length, 9—11 mm.

*Hab.* Parasitic on *Andrena Clarkella*; rare. Hampstead; Hastings; Glanvilles Wootton, Dorset; Fordlands, Devon; Leominster; Carlisle; Colchester.

14. *Nomada bifida*, Thoms. (Pl. VII., figs. 7--7b).

Thoms., Hym. Scand., ii., p. 196.

This species is very closely allied to *ruficornis*, but the bifid mandibles and the following characters will distinguish it easily.

♂. Mandibles bifid at the apex, the pubescence of the thorax denser, and the spines at the apex of the posterior tibiæ hidden in a dense tuft of very fine silvery hairs (for genitalia see Pl. VII., figs. 7--7b).

♀. Mandibles bifid; metathorax with a conspicuous patch of silvery hairs on each side below the basal triangle; posterior tibiæ with the spines of equal length, and the apex clothed with a fine close silvery white pubescence.

In colour both sexes resemble *ruficornis* in almost every particular, *i. e.*, certain of its varieties, as *bifida* does not vary to such an extent as *ruficornis*; in the ♂ the pale bands of the abdomen are generally continuous or nearly so, and the ♀ has generally two very large lateral spots on the 2nd segment, a small one on each side of the 3rd, and a transverse line across the middle of the 4th and 5th at the base. Length, 8--11 mm.

*Hab.* The only localities I know for this species at present are Canterbury, May; Chobham, June; and near Norwich, J. B. Bridgman; but I have no doubt that it is mixed in many collections, as it was in my own till quite lately, with *ruficornis*. F. Smith evidently recognised the characters of *bifida*, but apparently doubted if they were of specific value, as I find, in some MS. notes of his, kindly lent to me by Dr. Mason, the following remarks under *ruficornis*:—"The types in Kirby's collection are all the dark-coloured vars. I am not satisfied of the dark vars. being identical with the pale examples which are described by Kirby under the name *flava*; the differences which present themselves are a general darker shade of red on the abdomen, and in the markings of the head and thorax. The ocelli are usually enclosed in a red ring. The wings are clouded with dark stains, and the mandibles are shorter, stouter, and usually bidentate, the teeth more or less developed; in *flava* the mandibles are sensibly more slender, longer, and not bidentate, but terminate in an acute point."

15. *Nomada ochrostoma*, Kirb. (Pl. VI., figs. 11—11 b).

Kirb., Mon. Ap. Angl., ii., p. 209; Smith, Cat. Brit. Hym., 2nd ed., p. 116 = *lateralis*, Smith, pars ? = *punctiscuta*, Thoms.

Very like the variety of *ruficornis* with small lateral spots on the abdomen; mandibles truncate at the apex; mesothorax and scutellum very coarsely and rugosely punctured; ♂ with the scape of the antennæ ferruginous; ♀ with the mesothorax with red longitudinal lines; 2nd segment of the abdomen with a small round yellow spot on each side.

♂. Head and thorax black, coarsely and deeply punctured, clothed with pale ochreous hairs, face below the antennæ with silvery ones; mandibles, except their piceous apices, labrum, clypeus in front, and the face at the sides of the clypeus, flavous; mandibles simply truncate; clypeus truncate, the angles of the truncature more or less prominent. Antennæ with the scape beneath and the flagellum fulvous; scape above and the first five or six joints of the flagellum above black; 3rd joint much longer than 2nd. Thorax with the tubercles and tegulæ testaceous: wings smoky; scutellum raised, very largely punctured, with two red spots, or entirely red; metathorax hairy and rugosely punctured at the sides. Abdomen ferruginous, black at the extreme base; 2nd, 3rd, and 4th segments with a small lateral pale yellow spot on each side; 5th with a transverse discal spot on each side; 6th with a single transverse discal spot; 7th narrowly emarginate at the apex; in some varieties there is a black line at the base of the segments, and in some the spots are larger, and the surface of the abdomen clothed with a fine white pubescence; beneath with the segments more or less darker at the base and apex; 6th segment densely hairy at the apex, and with a small pale spot,—in some varieties some of the other segments are occasionally spotted with yellow; 8th segment with the apical process short, much curved, widened at the apex; sides fringed with spines near the apex and hairs towards the base (for genitalia, see Pl. VI., figs. 11—11 b). Legs ferruginous; femora at the base and often a spot on the tibiæ black; apex of the tibiæ armed outwardly with irregular spines and clothed with fine white hairs.

♀. Very like that sex of *ruficornis*, but with the mandibles truncate; the 2nd segment of the abdomen with only a small round lateral spot; the antennæ shorter, and the puncturation of the thorax, and especially of the scutellum, much larger. Length, 7—8 mm.

*Hab.* London District, Chobham, Norwich, Plymouth,

Penzance, Yorkshire, &c.; not generally common. F. Smith says that it is a parasite of *Andrena labialis*. It occurs from May to August.

16. *Nomada Roberjeotiana*, Panz. (Pl. VI., figs. 1—1 b).

Panz., Faun. Germ., 72, 18—19; Smith, Cat. Brit. Hym., 2nd ed., p. 124.

Head and thorax smooth, clearly punctured; metathorax with the sides below the basal area bright and shining. Abdomen bright ferruginous, much suffused with black, especially towards the apex; 2nd and 3rd segments with yellowish white lateral spots; 4th and 5th in the ♂ with indications of bands; 5th in the ♀ with a quadrate spot.

♂. Head and thorax very slightly shining, black, sparingly clothed with short greyish hairs, the intervals between the punctures wider than the punctures themselves, especially on the disk of the latter; mandibles, except the extreme piceous apex, labrum, clypeus, and face at the sides below the antennæ, flavous; clypeus densely clothed with erect hairs. Antennæ with scape in front flavous; flagellum rufescent, with an obscure line along its back; 1st joint unusually large and visible; 2nd and 3rd subequal. Thorax with two spots on the collar, the tubercles and the tegulæ flavous; wings slightly smoky; 1st transverse median nervure uniting with the cubital before the base of the furcature; scutellum scarcely raised, ferruginous; metathorax with the basal area dull, finely rugose, its sides beyond it polished and remotely punctured. Abdomen shining, distinctly punctured; 1st segment black at the base, ferruginous at the apex; 2nd ferruginous, the sides narrowly black at the base, and each with an oval yellowish white spot; 3rd widely black at the base, with a pale lateral oval spot; 4th, 5th, and 6th only ferruginous at the apex, and with irregular pale basal bands; 7th segment somewhat truncate at the apex; beneath with the basal segments ferruginous; the apical segments black; 2nd and 3rd often with a yellow spot on each side; 6th segment densely clothed with somewhat curled pale hairs; 8th with the apical process very short and broad, widely rounded at the apex, fringed with pale fine spines at the sides, and a long thick piceous spine at each side of the apex (for genitalia see Pl. VI., figs. 1—1 b). Legs: femora black at the base, tibiæ and tarsi ferruginous, the posterior tibiæ clouded across the middle.

♀. Very like the ♂, but with the mandibles and labrum ferruginous, the clypeus black, with the extreme apical margin ferruginous. Antennæ entirely ferruginous, darker above; collar, tubercles, and tegulæ of thorax ferruginous; wings as in the ♂

metathorax as in the ♂. Abdomen rather more brightly coloured, but similarly marked; the 5th segment with a large quadrate white spot; beneath with the basal segments ferruginous, the apical black. Legs as in the ♂. Length, 6—7 mm.

*Hab.* Rare. Blackwater, Hants; Chobham, Surrey; Carlisle; on *Senecio* and other yellow Composite flowers in June and July.

17. *Nomada obtusifrons*, Nyl. (Pl. VII., fig. 8).

Nyl., Not. Sallsk., pro Faun. Flor. Fenn., Forh., i., p. 184 = *xanthostieta*, Smith, Cat. Brit. Hym., 2nd ed., p. 124 (not *xanthostieta*, Smith, 1st ed.) = *mistura*, Smith.

Small; labrum black; both sexes without a sharp carina between the antennæ; ♂ with the abdomen piceous, with a yellowish white spot at each side of the 2nd and 3rd segments; ♀ with the abdomen ferruginous, spotted as in the ♂, but with a large quadrate spot on the 5th segment; the spots are sometimes obsolete.

♂. Head and thorax black, clothed with greyish brown hairs, largely and closely punctured; mandibles short and thick, testaceous, piceous at the apex; labrum black; clypeus with the extreme margin piceous. Antennæ black; face between the antennæ with an obtuse elongate tubercle; flagellum testaceous beneath, its 2nd joint longer than the 3rd. Thorax with the tubercles pale, the tegulæ piceous; wings slightly dusky; 1st transverse median nervure uniting with the cubital before the furcature; scutellum entirely black; metathorax nearly smooth on its basal area. Abdomen punctured, piceous-black, the apices of the segments paler, the 2nd and 3rd with a yellowish white lateral spot; the 4th and 5th with white transverse lines, that on the 4th often obsolete; apical segment rounded at the extremity; beneath pitchy black, the apices of the segments paler; 6th segment with a small pale apical spot, but not densely hairy as in most of the species (for genitalia see Pl. VII., fig. 8). Legs piceous; base of the femora and a cloud across the tibiæ black or nearly so.

♀. Like the ♂ as to the head and thorax, both in colour and puncturation, but with a much shorter, hardly conspicuous, pubescence. Abdomen ferruginous; 2nd and 3rd segments with a yellowish white spot on each side; 5th with a square white central spot, the spots are sometimes wanting; 3rd and 4th segments piceous towards the apex; beneath ferruginous. Legs as in the ♂, but paler. Length, 6 mm.

*Hab.* Rare. Norwich; Ilfracombe; Yarm, Yorkshire; Scotland.



Easily recognised by the blunt tubercle between the antennæ, where in the other species there is a sharp carina.

18. *Nomada armata*, H.-Sch.

H.-Sch., Germ. Zeitsch., i., p. 279; Smith, Cat. Brit. Hym., 2nd ed., p. 118.

Large; labrum black; anterior femora in the ♂ dilated and excavated in front; labrum of the ♀ produced into a tooth anteriorly. Abdomen ferruginous, with yellow lateral spots.

♂. Head and thorax black, densely and rugosely punctured, clothed with grey hairs, the hairs on the face below the antennæ silvery white; mandibles ferruginous, flavous at the base and piceous at the apex; labrum black, with a tooth at the apex; clypeus black; sides of the face just above the mandibles yellow. Antennæ with the scape black, the flagellum pale ferruginous, its 2nd joint longer than the 3rd. Thorax black; tegulæ and tubercles testaceous; wings with a dark apical border. Abdomen bright ferruginous, the extreme base black; 2nd, 3rd, and 4th segments each with a spot on each side; 5th and 6th with an apical dorsal spot; base of the 5th and 6th segments black; 7th segment narrow, deeply emarginate at the apex; beneath ferruginous, apex of the segments fringed with silvery hairs at the sides. Legs with the femora black, except at the extreme apex; tibiæ and tarsi ferruginous, the basal joint of the posterior tarsi black above; anterior femora dilated at the base, excavated, and very shining in front.

♀. Like the ♂ in general colour, but larger; mandibles ferruginous, pitchy black at the apex; labrum black, with a well-developed apical tooth; face clothed with silvery hairs below the antennæ, with brownish on the vertex. Antennæ ferruginous; 8th to 11th joints darker; scape black in front and behind; flagellum with the 2nd joint much longer than 3rd. Thorax clothed with short brown hairs; collar, tubercles, and tegulæ testaceous; wings clouded, with a distinct apical band, as in the ♂; mesopleuræ with a tuft of silvery hairs; scutellum red; post-scutellum with a red line; metathorax densely clothed at the sides with silvery hairs. Abdomen wider than in the ♂, but similarly coloured. Legs ferruginous; femora black at the base and beneath; posterior tibiæ with a black mark within; posterior metatarsi black; posterior coxæ densely clothed with silvery hairs. Length, 11—12 mm.

*Hab.* Norwich; Deal; Exeter; Penzance; Morthoe, N. Devon. Very rare; parasitic on *Andrena Hattorfiana*.

19. *Nomada ferruginata*, Kirb. (Pl. VII., figs. 6—6 b).

Kirb., Mon. Ap. Angl., ii., p. 218 = *germanica*, Smith, Cat. Brit. Hym., 2nd ed., p. 126 (nec Panz.).

Head and thorax black, clothed with greyish brown hairs; labrum black; 3rd, 4th, and 5th joints of flagellum dilated in the ♂, and black above. Abdomen ferruginous in both sexes, spotted with black.

♂. Head and thorax black, closely and largely punctured, rather densely clothed with greyish brown hairs; hairs of the face below the antennæ and of the thorax below the wings, silvery; mandibles ferruginous, flavous at the base, somewhat rounded at the apex, which is piceous; labrum black, armed with a strong central tooth; cheeks between the eyes and the mandibles flavous; clypeus testaceous at the apex. Antennæ with the scape very wide, black; 1st joint of the flagellum hidden; 2nd much shorter than 3rd; 3rd, 4th, and 5th swollen; 6th, 7th, 8th, and 9th with a small tubercular elevation at the side; terminal joint nearly as long as the two preceding together. Thorax with the tubercles and tegulæ testaceous; wings with a dark apical border, otherwise but little clouded; scutellum with two dull red spots. Abdomen finely punctured, ferruginous-red, its base black, with a black basal spot on each side of the 2nd and 3rd segments, and a black line at the base of the 4th, 5th, and 6th; apical segment narrowly rounded, sides and apex of the abdomen with silvery hairs; beneath punctured, the base of each segment black in the middle, and the apical margins fringed with white hairs at the sides; 8th segment with its apical process short and dilated at the apex, which is sinuated and armed on each side with two strong reflexed spines, the sides of the process fringed with hairs (for genitalia see Pl. VII., figs. 6—6 b). Legs ferruginous; femora at their base, especially beneath, black; posterior femora densely hairy beneath; tibiæ with a black spot near the apex.

♀. Very like the ♂, but with the mandibles piceous, the labrum with a central tubercle, face below the antennæ without silvery hairs, cheeks between the eyes and mandibles testaceous. Antennæ simple, flagellum ferruginous, slightly darker above; wings clouded. Abdomen and legs marked as in the ♂, but the former with less silvery pubescence at the sides, and the latter with the posterior metatarsi black. Length, 7—8 mm.

*Hab.* London District, rarely; Deal; Reigate; Chobham; Blackwater, Hants; Bournemouth; Exeter; Penzance; Yorkshire. Parasitic on *Andrena fulvescens*; appears in July and August.

The coloration of this species varies very much, especially in the ♂, some specimens being almost entirely black (var. *atrata*, Smith).

20. *Nomada Fabriciana*, Linn. (Pl. VII., figs. 1—1 b).

Linn., Syst. Nat., ed. xii., p. 955; Smith, Cat. Brit. Hym., 2nd ed., p. 125.

Very like the preceding in some varieties, but at once distinguished by the simple antennæ of the ♂, and the longer antennæ of the ♀, which have a broad black band extending across the 8th, 9th, 10th, and 11th joints.

♂. Head and thorax deep black, closely and deeply punctured, clothed with greyish hairs; mandibles black, or very dark piceous; labrum and clypeus black; cheeks between the eyes and mandibles flavous; face below the antennæ clothed with silvery hairs. Antennæ with the scape black; flagellum piceous, black above, its 2nd joint scarcely half the length of the 3rd. Thorax with the tubercles and tegulæ black; wings clouded; scutellum entirely black; metathorax with the basal area finely rugose. Abdomen ferruginous; base of the 1st segment black, and often also the bases and apices of the other segments; the 2nd and 3rd segments generally with a yellow lateral spot; sometimes, however, the whole abdomen is ferruginous, with the exception of the black base; 7th segment sharply emarginate at the apex; beneath ferruginous, largely and remotely punctured; 8th segment with a very long apical process, fringed with fine hairs at the sides, scarcely dilated at the apex, which has a fine somewhat reflexed spine on each side (for genitalia see Pl. VII., figs. 1—1 b).

♀. Larger and stouter than the ♂; face entirely black, clothed with black and grey hairs. Antennæ rather long, scape black; 2nd joint of flagellum ferruginous-red beneath, black above, rather more than half as long as the 3rd; 3rd, 4th, 5th, and 6th ferruginous-red; 7th to 11th black; apical joint ferruginous. Thorax with the tubercles black, tegulæ testaceous; wings as in the ♂. Abdomen dark ferruginous-red, base black; the 2nd and 3rd segments often with a round yellow spot on each side; margins of the segments generally more or less black, beneath ferruginous, sides of the segments with a few prominent hairs. Legs black; knees and the anterior femora and tibiæ in front testaceous. Length, 7—9 mm.

*Hab.* Not rare, and generally distributed; I have taken it on Wandsworth Common as early as May, and at Hastings as late as August 16th. F. Smith says

“parasitic on *Panurgus Banksianus*,” but in the localities where I have taken it, it certainly was not attached to that species, but probably to some *Andrena*. As *A. Gwynana* occurs at Wandsworth in the spring, where I have taken *Fabriciana* in April, and *Gwynana (bicolor)* occurs at Hastings close to the spot where I took *Fabriciana* in August, I think it is very probable that it is also parasitic on that species, and double-brooded like its host.

21. *Nomada flavoguttata*, Kirb. (Pl. VII., figs. 4—4 b).

Kirb., Mon. Ap. Angl., ii., p. 215; Smith, Cat. Brit. Hym., 2nd ed., p. 123.

Small; antennæ long, ferruginous, darker above, scape black; 3rd joint of flagellum much longer than 2nd; labrum black; mesothorax in the ♀ with red lines. Abdomen ferruginous, banded in the ♂ with slightly darker bands; 2nd and 3rd segments with a small round spot on each side.

♂. Head and thorax black, closely and largely punctured, clothed with greyish hairs; mandibles flavous, their apices piceous; labrum black; clypeus, except at the base, and cheeks at its side, flavous. Antennæ with the scape black; flagellum ferruginous, dark above; 3rd joint twice as long as the 2nd or more. Thorax with the tubercles and tegulæ piceous; wings smoky; metathorax more or less shining in the centre. Abdomen ferruginous; 1st segment black at the base; the other segments rather paler towards the base, the 2nd and 3rd with a flavous spot on each side; 7th segment slightly emarginate, beneath ferruginous; 8th segment with the apical process long, rather widened at the apex, with long reflexed apical spines (for genitalia see Pl. VII., figs. 4—4 b). Legs piceous, knees and tibiæ and femora in front paler.

♀. The labrum black, the mandibles, clypeus, and antennæ ferruginous; the 3rd joint of the flagellum not quite twice as long as the 2nd; prothorax ferruginous-red, tubercles testaceous; mesothorax with red lines, tegulæ testaceous; mesopleuræ each with a large red spot; wings smoky; scutellum and post-scutellum red; metathorax with a tuft of silvery white hairs on each side above the insertion of the body. Abdomen shining, ferruginous; 1st segment black at the base; 2nd and 3rd with a very small flavous spot on each side,—these spots are not well defined, and are often scarcely noticeable or entirely absent; 3rd and 4th segments darker towards the apex, and 5th towards the base; apex of the 5th densely fringed with very fine silvery hairs; beneath ferruginous;

5th segment with a tuft of dark hairs on each side. Legs ferruginous; femora slightly darker beneath; posterior tibiæ with two short uneven spines near the outer angle. Length, 6—7 mm.

*Hab.* Generally distributed. London District, Tunbridge Wells, Worthing, Hastings, Exeter, Penzance, Yorkshire, Norwich, &c.

This little species is easily known from the others which have the labrum black, by its long pale antennæ and the great length of the 3rd joint of the flagellum.

22. *Nomada furva*, Panz. (Pl. VII., figs. 3—3 b).

Panz., Faun. Germ., 55, 33; Smith, Cat. Brit. Hym., 2nd ed., p. 122.

Dark pitchy brown, very small; apical joint of antennæ pale; ♂ with a yellow lateral spot on the 2nd and 3rd segments; ♀ with the sides of the segments only slightly paler, or with paler transverse bands.

♂. Pitchy brown; head and thorax closely punctured, clothed sparingly with pale ochreous hairs; mandibles pale in the centre; labrum with a pale spot on each side of the base; face almost entirely black; clypeus at the extreme sides pale, as also the cheeks between the eyes and mandibles; face below the antennæ clothed with silvery hairs. Antennæ with the scape black, flagellum testaceous beneath, and with the whole of the apical joint pale testaceous; 2nd and 3rd joints subequal. Thorax with the tegulæ and tubercles piceous; wings clouded, with a dark apical margin. Abdomen with a yellow spot on each side of the 2nd, and sometimes of the 3rd segment, and occasionally with a basal line of the same colour on the other segments; 8th segment armed with two very strong recurved spines at the apex (for genitalia see Pl. VII., figs. 3—3 b). Legs with the knees and the femora and tibiæ in front paler.

♀. Rather paler than the ♂; labrum testaceous, as also the mandibles, apex of clypeus, and cheeks between the eyes and mandibles. Antennæ with the 2nd joint of the flagellum shorter than the 3rd. Thorax as in the ♂, but with a rufescent spot on the mesopleuræ. Abdomen without yellow spots, but with paler lateral spots or with transverse paler bands; 5th segment with a dense fringe of very fine white hairs. Legs as in the ♂. Length, 4—5 mm.

*Hab.* Common; parasitic on small species of *Halictus*.

EPEOLUS, *Latr.*

Hist. Nat., iii., p. 375.

Wings with three submarginal cells; labial palpi 4-jointed maxillary palpi 1-jointed; ♂ with six ventral segments exposed; 7th truncate; 8th narrow and tongue-like.

A small genus of short stout bees, the abdomen banded or spotted with white pubescence.

- (2) 1. Femora black in both sexes; labrum 3-dentate; the discal tubercles placed near its centre .. .. *productus*.  
 (1) 2. Femora red in ♀; labrum simple; discal tubercles nearer the anterior margin .. .. *rufipes*.

1. *Epeolus productus*, Thoms. (Pl. VII., fig. 10—10 b).

Thoms., *Opusc. Ent.*, p. 91; *Hym. Scand.*, vol. ii., p. 211.

Black; labrum bidentate at the apex, and with two small tubercular teeth situated near the middle. Thorax with the tubercles and tegulæ in the ♂ and also the scutellum in the ♀ rufous; collar in the ♀ ferruginous. Abdomen with white pubescent spots or bands; beneath somewhat shining; 2nd segment largely and clearly punctured. Legs ferruginous; femora more or less black.

♂. Head and thorax black, largely and rugosely punctured; face clothed with silvery hairs; labrum tridentate at the apex, and with two small teeth near the middle; mandibles pitchy red in the centre. Antennæ short, its joints transverse; 2nd joint of the flagellum considerably longer than the 3rd. Thorax with the prothorax, the mesothorax in front and under the wings, and the metathorax at the sides, clothed with brownish white hairs; tubercles black; tegulæ rufous; wings slightly dusky, with a darker apical margin; nervures testaceous at the base; scutellum very rugose, subdentate at the sides, much produced over the metathorax, its central lobe slightly depressed in the centre; metathorax shining. Abdomen black, closely punctured; 1st segment with a lateral band of white pubescence at the apex, and at the base united at the sides, but not meeting on the disk, the following segments each with four spots along the posterior margin, the discal ones of the 2nd segment connected with the lateral; apical dorsal valve narrow, its sides parallel, rounded at the extremity; beneath black; 2nd and 3rd segments paler at the apex, and clothed with silvery hairs; 4th and 5th widely emarginate at the apex, and densely fringed with curved brown hairs; 6th rounded; 7th sharply truncate, the

angles of the truncature slightly produced; 8th narrow and tongue-like (for genitalia see Pl. VII., figs. 10—10 b). Legs ferruginous; femora black.

♀. Slightly larger, less pubescent, and with the central lobe of the scutellum and the tubercles rufous. Abdomen generally with the four spots distinct on the 2nd segment, as well as on the following; abdomen beneath black, somewhat shining; 2nd segment largely and distinctly punctured; apical segment rather narrowly rounded; 3rd and 4th with a pubescent apical band. Legs red; posterior and intermediate femora black above. Length, 8—10 mm.

*Hab.* Sandy places; Norwich, Littlehampton, Hayling Island, and probably in many other places, but confused with the following under the old name *variegatus*.

2. *Epeolus rufipes*, Thoms. (Pl. VII., figs. 9—9 a).

Thoms., Opusc. Ent., p. 91; Hym. Scand., vol. ii., p. 212 = *variegatus*, Sm. nec Linn.?

Extremely like the preceding, but differs in the following characters, which I think are certainly of specific value:—

The labrum has its apical margin simple, not tridentate, and the two teeth on the disk situated considerably below the middle; the spots on the 3rd and following segments of the abdomen are more transverse, and tend more to form bands; the apical dorsal valve of the ♂ is not parallel-sided as in *productus*, but is slightly narrowed towards the apex; beneath, the abdomen is dull and often rufescent, and the 2nd segment is closely and finely punctured; the apical segment of the ♀ is very largely and widely rounded, and the legs in that sex entirely red. Length, 5—8 mm.

*Hab.* Deal; Falmouth.

The confusion of the two species makes it impossible to quote localities, except where the actual specimens have been seen.

#### MELECTA, *Latr.*

Hist. Nat., xiv., p. 48.

Labial palpi 4-jointed, maxillary palpi 5-jointed; 1st joint of the former much more than twice the length of the 2nd; wings with three submarginal cells; ♂ with six ventral segments exposed; the 7th somewhat bifurcate at the apex; the 8th subtriangular, with a few apical setæ; armature stout; cardo small.

A genus of parasitic bees found with *Anthophora*.

- (2) 1. Pubescence of head and thorax ashy grey; lateral spots of the 3rd and 4th abdominal segments large and quadrate .. .. . *luctuosa*.
- (1) 2. Pubescence of head and thorax brownish or greenish grey; spots of 3rd and 4th segments small and punctiform .. .. . *armata*.

1. *Melecta luctuosa*, Scop. (Pl. VIII., figs. 2—2 b).

Scop., Ann. Hist. Nat., iv., p. 9; Smith, Cat. Brit. Hym., 2nd ed., p. 136.

Black, shining. Thorax in front densely clothed with grey hairs; segments of the abdomen with transverse lateral spots of white pubescence; tibiæ with a white basal spot.

♂. Head rugosely punctured; vertex clothed with grey and black hairs intermixed; face in front of the antennæ clothed with white hairs, bordered with black hairs at the side; labrum clothed with black hairs; scape of the antennæ with long white hairs beneath. Thorax covered with greyish white hairs in front as far as the scutellum; scutellum with black hairs; metathorax with black hairs in the centre, and with a tuft of silvery white hairs on each side; wings rather smoky, with darker spots in some of the cells; mesopleuræ with a dense white pubescence. Abdomen shining, very finely punctured; basal segment clothed, except at the apex, with silvery grey hairs; 2nd to 5th segments clothed with very short black hairs, and each with a lateral apical spot of silvery white hairs,—these spots on all the segments of a more or less transverse form; 7th segment shining and emarginate at the apex; beneath entirely black, clothed with short black hairs; 6th segment slightly foveated in the middle; 7th produced at the apex, and deeply cleft, each point with a few bristly hairs; 8th with a very short wide apical process, which is truncate at its extremity (for genitalia see Pl. VIII., figs. 2—2 b). Legs black; a spot on each tibia at the base, and all the tarsi in front, clothed with white hairs.

♀. Like the ♂, but has the hairs on the face below the antennæ black, except those on the base of the clypeus; the basal segment of the abdomen with only a few scattered white hairs at the base, and a tuft of white hairs on each side at the apex; 2nd, 3rd, and 4th segments each with a transverse lateral spot near the apical margin; dorsal valve of the 6th segment narrow and rounded at the apex. Length, 13 mm.

*Hab.* Not rare; parasitic on *Anthophora retusa*.



2. *Melecta armata*, Panz. (Pl. VIII., figs. 1—1 b).

Panz., Faun. Germ., 70, 22; Smith, Cat. Brit. Hym., 2nd ed., p. 137.

Black, shining. Thorax clothed with brownish grey hairs; 1st and 2nd segments of the abdomen with a tuft of greyish hairs, 4th and 5th with a small round spot of silvery white hairs; these spots are variable in size, and sometimes entirely absent in the ♀.

Very like the preceding species, but differing in the following particulars:—

♂. With the pubescence of a generally browner hue; face entirely clothed with ochreous white hairs. Thorax clothed with brownish grey hairs as far as the scutellum; scutellum and metathorax with black hairs, a tuft of greyish brown hairs on each side of the latter. Abdomen rather more coarsely punctured; 1st segment sparingly clothed with brownish grey hairs, and with a tuft of hairs on each side; 2nd and following segments clothed with short black hairs, the 2nd with a tuft of brownish grey hairs on each side, the 3rd, 4th, and sometimes the 5th with a small round lateral spot of white hairs; 7th widely emarginate at the apex, dull, clothed with black hairs; beneath entirely black, 8th segment produced at the apex into two small hairy tubercles (for genitalia, &c., see Pl. VIII., figs. 1—1 b). Legs with the tibiæ clothed with ochreous hairs externally, except at the apex; posterior metatarsi slightly curved, narrow at the base, and then slightly dilated on their external margin; tarsi clothed with pale hairs above.

♀. Only differs from the ♂ in having the pubescence of a paler grey, and in having the tibiæ with only a spot of white hairs at the base. It may be known from that of *luctuosa* by its having the spots on the 3rd and 4th segments of the abdomen punctiform, and by the curved posterior metatarsi. In some varieties the abdomen is entirely black. Length, 13 mm.

Parasitic on *Anthophora pilipes*, and not uncommon where that species occurs.

## CÆLIOXYS, Latr.

Latr., Gen. Crust. et Ins., iv., p. 166.

Wings with two submarginal cells. Maxillary palpi 3-jointed; labial palpi 4-jointed. Eyes hairy; scutellum dentate at each side; ♂, apex of abdomen blunt, multispinose; four ventral segments exposed, the 5th only just visible at its apex; 8th segment tongue-shaped; armature with the stipites long and straight, hairy

at the apex; sagittæ covered with a membranous skin; ♀, apex of abdomen more or less acute; ventral 6th segment projecting beyond the dorsal. Anterior coxæ of ♂ with stout blunt spines.

A genus of parasitic bees generally to be found near the burrows of *Megachile*.

- (2) 1. External spur of hind tibiæ blunt .. .. . *vectis*.  
 (1) 2. External spur of hind tibiæ sharp.  
 (6) 3. ♂ with the 4th abdominal segment deeply emarginate beneath; ♀ with the 5th segment beneath rounded at the apex; calcaria black or piceous.  
 (5) 4. ♂ with the 5th segment above not toothed at the side; ♀ with the apical ventral valve elongate and lanceolate .. .. . *4-dentata*.  
 (4) 5. ♂ with the 5th segment above toothed at the sides; ♀ with the ventral valve shorter and angularly truncate at the apex .. .. . *rufescens*.  
 (3) 6. ♂ 4th segment of abdomen entire beneath; ♀ 5th segment truncate or emarginate at the apex; calcaria pale.  
 (8) 7. ♂ with the puncturation of the 4th segment beneath as coarse and scattered as that of the 2nd and 3rd; ♀ 4th segment beneath largely and remotely punctured, 6th segment above without a white pilose band .. .. . *acuminata*.  
 (7) 8. ♂ puncturation of 4th segment beneath distinctly finer and closer than that of the 2nd and 3rd; ♀ 4th segment beneath closely and finely punctured, 5th segment above with a white pilose band at the base .. .. . *simplex*.

### 1. *Cœlioxys vectis*, Curt. (Pl. VIII., fig. 7).

Curt., Brit. Ent., viii., p. 349, pl. 349; Smith, Cat. Brit. Hym., 2nd ed., p. 146.

Black, rugosely punctured; abdominal segments with triangular lateral spots of white pubescence; ♂ with the 6th segment armed with two sharp basal teeth, its apex bifid and produced into four teeth, the two upper ones short and blunt, and the lower ones long and acute; ♀ with the 6th ventral valve widely lanceolate, simple; external spur of posterior tibiæ blunt in both sexes.

♂. Head very largely and rugosely punctured; face densely clothed with long ochreous hairs; mandibles bifid. Thorax densely and rugosely punctured, sparingly clothed on the disk and rather densely at the sides, and on the metathorax with pale ochreous hairs; wings smoky; scutellum with a blunt spine on each side. Abdomen subconical, deeply and largely punctured, scarcely shining; puncturation of the 1st segment very close; 2nd and following segments with a diagonal impression on each side, almost meeting

in the centre; apex of each segment with a triangular lateral spot of pale pubescence; 5th segment above with a slightly prominent lateral angle; 6th with a rather long lateral basal spine, apex with two blunt teeth above, which are produced below into two longer sharp spine-like teeth; beneath strongly punctured, the puncturation of each succeeding segment finer than that of its predecessor; each segment at the apex with a lateral patch of white hairs; 4th segment bidentate at the apex; 6th at the apex with a corneous, rounded, central lobe (for genitalia see Pl. VIII., fig. 7). Legs clothed with short whitish hairs; outer calcar of posterior tibiæ blunt.

♀. Like the ♂, but with the pubescence of the face shorter; the abdomen in the shape of an elongate triangle; segments sculptured and spotted at the sides, as in the ♂; 6th segment finely punctured, narrowed to the apex, which is somewhat rounded, its centre with a longitudinal raised line, and each side with a carina running parallel to its margin; beneath with the 5th segment very finely punctured and clothed with a fine brownish pubescence near its apex; 6th widely lanceolate, with a slight indication of a constriction near the apex. Length, 13—15 mm.

*Hab.* Isle of Wight, Sandown, flowers of bramble; Shirley; Wimbledon; Lowestoft; Morthoe, N. Devon.

Easily recognised by the spots of the abdomen, and the blunt spine on the tibiæ.

## 2. *Cælioxys quadridentata*, Linn. (Pl. VIII., fig. 4).

Linn., Syst. Nat., ed. x., i., p. 577; Smith, Cat. Brit. Hym., 2nd ed., p. 141.

Black, rugosely punctured; abdominal segments with entire bands of pale pubescence; 6th segment of the ♂ armed with six teeth, arranged as in *vectis*, but the upper pair of apical ones sharper and more spiniform; 5th segment not spinose at the apex laterally; ♀ with the 6th ventral segment elongate-lanceolate, constricted before the apex; calcaria sharp in both sexes.

♂. Head and thorax, in fresh specimens, densely clothed with golden brown hairs, largely and rugosely punctured; wings clouded; scutellum with a tooth on each side. Abdomen subconical, largely punctured; 1st segment clothed with long golden brown hairs; 2nd segment widely impressed across the middle, and clothed at the apex with a fringe of golden brown hairs; 3rd, 4th, and 5th segments like the 2nd, but less impressed; 5th without a lateral spine or tooth at the apex; 6th with a narrow spiniform tooth on each side at the base, and with two apical processes, each of which,

looked at laterally, is bidentate, the upper tooth narrowly triangular, the lower one longer and spiniform; beneath largely punctured, each segment fringed with pale hairs at the apex; apex of the 4th narrowly emarginate in the centre, with a slightly projecting angle on each side of the emargination; 6th just visible in the middle, where it is produced into a corneous lobe (for genitalia see Pl. VIII., fig. 4). Legs clothed with brownish grey hairs; all the calcaria sharp and black.

♀. Very like the ♂, but with the abdomen conical and narrowly pointed at the apex, shining, with the exception of the apical segment, its basal segment with a tuft of pale whitish hairs on each side; 2nd to 5th segments each with an apical fringe of pale hairs; 2nd and 3rd deeply impressed across the middle; basal segment and 2nd segment, above the central impression, closely and largely punctured, the rest very remotely; apical segment longitudinally carinated, dull, finely punctured, constricted towards the middle, then narrower to the apex; beneath with the 4th segment much more finely punctured than the 3rd; 5th entire at the apex, with the puncturation hardly visible; 6th longer than the dorsal valve, carinated down the centre, constricted near the apex, with its sides simply sinuate. Length, 12—13 mm.

*Hab.* Local. Chobham; Wakefield, Yorkshire; North Devon; Norwich; Yarmouth; &c.

### 3. *Cœlixys rufescens*, Lep. (Pl. VIII., fig. 3).

Lep., *Encycl. Méth.*, x., p. 109; Smith, *Cat. Brit. Hym.*, 2nd ed., p. 145; var. = *umbrina*, Smith.

Black, rugosely punctured; abdominal segments with continuous bands in the ♂, subcontinuous in the ♀, that of the 2nd and 3rd in this sex being very narrowly interrupted in the centre; 5th segment in the ♂ with a lateral tooth at the apex; ♀ with the 6th ventral segment triangularly truncate; calcaria piceous in both sexes.

Very like the preceding, but generally larger in the typical form; the smaller form, however, which was called by F. Smith *umbrina*, can only be distinguished by structural characters.

♂. Rather less densely pubescent than the preceding; basal segment of the abdomen clothed with hairs only on the sides; 5th segment without an apical band, and with a lateral tooth at the apex; 4th ventral segment emarginate in the centre, the emargination slightly wider than in *quadridentata* (for genitalia see Pl. VIII., fig. 3).

♀. With the puncturation of the abdomen more even and close than in the preceding, with the 6th segment more shining and more strongly punctured, somewhat inclined upwards towards its apex, and less finely attenuated; beneath the 5th segment is much longer and more pointed and strongly punctured; the 6th segment is short, its sides subparallel, its apex obtusely angulated. Length, 10—15 mm.

*Hab.* Common in some localities, and very variable in size. The small variety *umbrina* can be distinguished by no structural character from the large *rufescens*. It has occurred at Chobham, Hants, Isle of Wight, Devonshire, Yorkshire, Loch Rannoch, Norwich, and in Kent.

#### 4. *Caelioxys elongata*, Lep. (Pl. VIII., fig. 6).

Lep., Hym., ii., p. 522; Smith, Cat. Brit. Hym., 2nd ed., p. 142 = *simplex*, Nyl., Smith, 1st ed., &c.

Another species almost exactly like the two preceding in general shape and sculpture, but differing in the following particulars:—

♂. With the 5th dorsal segment toothed at the apex laterally; 6th with the two upper apical teeth slightly divergent, so that the two lower ones, which are nearly parallel, can be seen from above lying between them; the pubescent bands of the segments are wider at the sides, and narrowed towards the centre, where they are generally interrupted; beneath largely punctured; 4th segment more finely and closely punctured than the 3rd, entire at its apex, which has in its centre a smooth corneous lobe (for genitalia see Pl. VIII., fig. 6). Calcaria pale.

♀. With the abdomen irregularly and remotely punctured, as in *quadridentata*; the 2nd, 3rd, 4th, and 5th segments fringed at the apex with pale hairs, forming a band widening to the sides; 6th segment dull, narrowly rounded at the apex; beneath with the 4th and 5th segments very finely punctured, the 5th narrowly emarginate at the apex; 6th very long, constricted, and with a very minute tooth on each side before the apex. Calcaria pale. Length, 12 mm.

*Hab.* Widely distributed and common in many places. F. Smith says it is parasitic on *Megachile ligniseca*, *Willughbiella*, and *circumcincta*. I have taken it pretty freely at Chobham in places where the last-named species of *Megachile* occurs.

5. *Cœlixys acuminata*, Nyl. (Pl. VIII., fig. 5).

Nyl., (Revisio) Not. Salls. Faun. Flor. Fenn., Förh., ii., p. 279.

Differs from *elongata* in the following particulars:—

♂. Has the apical teeth of the 5th segment rather more spini-form, the upper apical spines of the 6th segment more divergent, the 4th segment beneath as largely and remotely punctured as the 3rd (for genitalia see Pl. VIII., fig. 5).

♀. Has the 5th abdominal segment without an apical fringe, and the 6th rather longer and more pointed, the bands of the other segments more widely interrupted; beneath the 4th segment is largely and clearly punctured, although less coarsely than the 3rd; the 6th segment is rather longer, the constriction less marked, and nearer the apex in proportion to the entire length of the segment. Length, 12 mm.

*Hab.* Hastings, Deal, Norwich, and Colchester, and probably common, but mixed with *elongata*.

N.B. *Mandibularis*, Nyl., which F. Smith refers to *elongata*, is a distinct species, with black calcaria and geniculated mandibles; but I do not know of its occurrence in this country.

## MEGACHILE, Latr.

Latr., Hist. Nat. Ins., xiv., p. 51.

Eyes not hairy; ♂ with the mandibles angularly produced at the base; anterior coxæ generally with a long blunt spine on each. Wings with two submarginal cells; maxillary palpi 2-jointed; labial palpi 4-jointed.

♂. With the 6th dorsal segment terminating the abdomen like a sort of cap, and bearing a well-marked apical crest, its posterior margin inferior; 7th dorsal segment inferior, and 8th dorsal inclosed in the 7th; four ventral segments only visible; 5th with an apical, central, more or less rugose, patch; 6th very narrow, and clothed across the middle with spine-like hairs, often recurved, or widened at the apex; apex of the segment often produced into a membranous wing; 7th so fragile and membranous that I have been unable to extract it entire; 8th narrow and tongue-like; genital armature very large at the base, the stipites more or less divergent, the sagittæ narrow and pointed (for figures of armature, see Pl. IX). Anterior coxæ each with a long, thick, blunt spine.

♀. With a dense ventral pollen-brush composed of beautifully straight spirally-grooved hairs.

- (6) 1. ♂ front tarsi dilated; ♀ mandibles largely flattened in front, the flattened portion wide at the base and deeply furrowed, the groove extending almost to the clypeus.
- (3) 2. ♂ posterior tibiæ dilated, thicker than the femora; ♀ scopa orange-red, pale whitish at the base, extreme apex darker .. .. . *maritima*.
- (2) 3. ♂ posterior tibiæ not dilated, scarcely so thick as the femora; scopa of ♀ dark, fulvous in the middle.
- (5) 4. Basal segments of abdomen covered with long fulvous hairs; apical segments with black hairs; ♂ with basal joint of anterior tarsi much longer than wide, its sides straight; ♀ without pale apical bands to the abdominal segments .. .. . *circumcincta*.
- (4) 5. Basal segments of abdomen with scattered hairs; ♂ with the basal joint of the anterior tarsi as wide as long, its sides slightly curved; ♀ with pale apical bands to the segments .. .. . *Willughbiella*.
- (1) 6. ♂ front tarsi simple; ♀ mandibles only flattened and grooved towards the apex.
- (12) 7. 6th segment of abdomen in ♂ not covered with pale hairs; scopa of ♀ not white; the apical margins of the segments naked.
- (9) 8. ♂ 6th segment entire or nearly so; ♀ scopa bright orange-fulvous .. .. . *centuncularis*.
- (8) 9. ♂ with crest of 6th segment distinctly emarginate; ♀ scopa not bright orange.
- (11) 10. ♂ tarsi pale; 7th segment spined; ♀ scopa entirely pale .. .. . *pyrina*.
- (10) 11. ♂ tarsi black; 7th segment not spined; ♀ scopa black on the two apical segments .. .. . *ligniseca*.
- (7) 12. ♂ 6th segment clothed above with a short adpressed pale pubescence; ♀ scopa white or nearly so; apical margins of the segments beneath fringed .. .. . *argentata*.

1. *Megachile maritima*, Kirb. (Pl. IX., figs. 2—2 b).

Kirb., Mon. Ap. Angl., ii., p. 242; Smith, Cat. Brit. Hym., 2nd ed., p. 179.

Black, clothed with brown or golden brown hairs; ♂ with the anterior tarsi white, dilated; posterior tibiæ curved, dilated, thicker than the femora; basal joint of tarsi very wide at the base, narrow at the apex; ♀ with the mandibles largely flattened in front, with a deep groove extending almost to the clypeus; scopa pale whitish at the base, orange-red in the middle, and dark at the extreme apex.

♂. Head closely and largely punctured; face densely clothed with pale ochreous hairs; mandibles whitish or pale towards the apex on their inferior margin. Antennæ with the apical joint more or less dilated and flattened. Thorax closely punctured, densely clothed with fulvous-brown hairs, those of the metathorax rather paler; wings with a slight apical cloud. Abdomen closely and finely punctured, each segment densely clothed with erect fulvous hairs, and with a narrow apical band of shorter, paler, decumbent hairs, the pubescence of the apical segments darker and browner; apical crest of 6th segment emarginate, and with a deep fovea in the emargination both on the dorsal and ventral sides; actual apex of the segment largely and semicircularly emarginate, angles of the emargination slightly prominent; 7th segment rarely visible, its apex truncate; ventral segments finely punctured, only four visible; 1st, 2nd, and 3rd densely clothed at the apex and sides with long pale hairs; 4th produced at the apex and truncate, its apical margin pale and submembranous; 5th with a suboval, pale, rugose, scale-like patch in the middle, extending from the base and projecting to slightly beyond what would appear to be the natural apex of the segment; 6th segment narrow, membranous, except at the sides; apex produced into a narrow truncate wing, the angles of the truncature considerably produced at the sides; on each side of the segment, above this membranous wing, is a tuft of hairs or spines, with their apices reflexed at an acute angle (this segment, under a microscope, is a most beautiful object); 7th segment, except at the sides, so thinly membranous that I have been unable to remove it, and cannot describe its form; 8th tongue-like, small, its base with a projecting tooth on each side (for genitalia, &c., see Pl. IX., figs. 2—2*b*). Legs black, covered with golden brown hairs; front coxæ with a long blunt spine on each, terminating in a sharp pencil of hairs; anterior femora and tibiæ pale in front and beneath, the former densely clothed with long hairs; tarsi largely dilated, white, fringed beneath with long white hairs; 2nd joint with an oblong brown spot near its lower margin; posterior femora slightly thickened, and the tibiæ of the same pair of legs much thickened and curved; tarsi dilated at the base.

♀. Head and thorax closely punctured, clothed with golden brown hairs; mandibles largely flattened in front, with a long deep groove terminating between the apical tooth and the next one to it. Antennæ with the apical joint slightly compressed, but not dilated, Abdomen punctured, clothed on the basal segments with pale golden brown hairs, on the remainder with erect black hairs; each segment at the apex with a line of short decumbent pale hairs; 6th segment slightly carinated in the middle towards the apex; beneath with the scopa composed of nearly white hairs on the 2nd segment,



of hairs of a somewhat orange-red colour on the 3rd and 4th, and of nearly black hairs on the 5th and 6th. Legs black, clothed with golden brown hairs; coxæ, femora, tibiæ, and tarsi simple, except that the basal joint of the posterior tarsi is enlarged and flattened, as in most of the *Anthophila*. Length, 14—15 mm.

*Hab.* Common in most places along our coasts; also at Norwich, Weybridge, &c.; but I do not know if it occurs frequently in the north.

Thomson says, 6th segment “acute 4-dentato.”

2. *Megachile Willughbiella*, Kirb. (Pl. IX., figs. 1—1 a).

Kirb., Mon. Ap. Angl., ii., p. 233; Smith, Cat. Brit. Hym., 2nd ed., p. 178.

Very like the preceding, but smaller, and differing in the following particulars:—

♂. With the pubescence less brightly coloured, and that of the abdomen less dense; 6th segment with the emargination of the apical crest wider and deeper, its real apex deeply emarginate, the sides of the emargination angularly produced; 7th segment just visible, with a central tooth, which is visible through the emargination of the 6th (this gives the appearance of the 7th segment being tridentate, as recorded by Smith); 6th ventral segment with the apical wing angularly produced in the middle of its anterior margin, besides being angulated at the sides (for genitalia, &c., see Pl. IX., figs. 1—1 a). Front legs with the tibiæ pale in front only at the apex; tarsi largely dilated and fringed; 1st joint nearly as broad as long; 2nd joint not spotted beneath; posterior tibiæ not thicker than the femora; basal joint of the tarsi not unusually dilated, nearly three times as long as wide.

♀. Very like that of *maritima*, but rather smaller, with the mandibles more rugose and less shining, and the groove less strongly marked and shorter; puncturation of the thorax rather less close, giving the surface a slightly less dull appearance. Abdomen with the 1st, 2nd, and 3rd segments clothed with short pale hairs, the remainder with black, the 4th and 5th having a pale apical fringe; segments deeply impressed at the base; beneath with the scopa orange-red, the hairs of the 5th and 6th segments black; legs with pale hairs. Length, 12—14 mm.

*Hab.* Generally common and widely distributed.

3. *Megachile circumcincta*, Lep. (Pl. IX., figs. 4—4 a).

Lep., Hym., ii., p. 335; Smith, Cat. Brit. Hym., 2nd ed., p. 177.

Face in the ♂ clothed with bright ochreous hairs, in the ♀ with black. Thorax in both sexes with bright brown hairs. Abdomen with ochreous-brown hairs on the 1st, 2nd, and 3rd segments, and with black on the rest; ♀ without pale apical bands, as in the preceding; ♂ with the front tarsi dilated, its 1st joint much longer than wide, its sides straight and subparallel.

♂. Head and thorax strongly punctured; face clothed with pale ochreous hairs; mandibles beneath produced into a rather more prominent triangular tooth at the base than in the other allied species, tridentate at the apex, the external tooth much the longest. Antennæ with the apical joint slightly dilated and flattened. Thorax clothed with bright brown hairs, punctured, the hairs on the metathorax and under the wings paler; wings slightly dusky. Abdomen somewhat shining, punctured, clothed on the three basal segments with hairs of the same colour as those on the metathorax, and with black hairs on the remaining segments; 6th segment with its apical crest deeply and narrowly emarginate, and its real apex (beneath) semicircularly emarginate, the angles of the emargination prominent and somewhat reflexed; 7th segment with a strong central tooth, visible ventral segments clothed with pale hairs; 6th segment (hidden) with the membranous wing at its apex less developed, and not angulated at its sides, and the spines at the sides differently shaped to those of either of the preceding (for genitalia, &c., see Pl. IX., figs. 4—4 a). Legs clothed with brown hairs; anterior coxæ with blunt spines, with scarcely any apical pencil of hairs; anterior femora pale and concave in front, densely clothed with hairs behind; tibiæ pale at the apex; tarsi dilated, pale, densely fringed, 1st joint elongate, nearly parallel-sided, 2nd joint with a black spot beneath; posterior tarsi with the basal joint rather shorter than in *Willughbiella*.

♀. Hairs of the face black; mandibles shining, largely punctured, groove very deep and long; thorax and first three segments of the abdomen densely clothed with pale but rather bright brown hairs, as in the ♂; last three segments entirely clothed with black hairs, without any pale fringe at the apex; segments not impressed at the base; segments beneath with the scopa dark orange, that of the two apical segments black. Legs with brown hairs. Length, 12—14 mm.

*Hab.* Not uncommon but local, burrowing in sandy banks, &c. F. Smith says that it usually lines its burrows with rose leaves. I have taken it freely at Chob-

ham, and Mr. Bridgman takes it at Norwich; it is very like *Willughbiella*, but the long straight basal joint of the anterior tarsi in the ♂ and the entirely black apical segments of the abdomen in the ♀, as well as the want of the basal impressions observable in *Willughbiella*, will easily distinguish it.

4. *Megachile ligniseca*, Kirb. (Pl. IX., figs. 3—3 a).

Kirb., Mon. Ap. Angl., ii., p. 243; Smith, Cat. Brit. Hym., 2nd ed., p. 173.

Black, clothed with dull brownish hairs; pubescence of the face brighter; ♂ front tarsi simple; 6th segment with its apical crest emarginate, 7th with its apex emarginate; ♀ large, with the scopa beneath pale ochreous.

♂. Head punctured; face clothed with bright brown and golden hairs; mandibles shining, rugose, tridentate. Antennæ rather long; apical joint not dilated, but flattened. - Thorax punctured rather more closely than the head and duller, clothed with ochreous-brown hairs, those of the metathorax and under side paler; wings with a darker apical margin. Abdomen punctured, segments much impressed at the base; 1st, 2nd, and base of the 3rd clothed with pale hairs like the metathorax, the remainder with black; 6th segment with its dorsal surface slightly carinated down the middle, its apical crest emarginate, the real apical margin of the segment (on its ventral surface) semicircularly excised; 7th segment with its apex emarginate; ventral segments clothed with pale greyish hairs; 5th with a large pale hairy central patch; 6th with the apical membranous portion reflexed, and slightly produced in the centre; the segment above the apical membrane is clothed with long bristly hairs, which are simple, not hooked, at the apex; 8th segment shaped much as in the other species (for genitalia, &c., see Pl. IX., figs. 3—3 a).

♀. As large or larger than that of *maritima*, clothed as the ♂; mandibles deeply punctured, only narrowly flattened in front, groove short, but deep and wide. Abdomen clothed with hairs of the same colour as that on the metathorax on the first three segments, and with short black hairs on the rest; the hairs of the 6th segment adpressed; all the segments with a fringe of pale hairs on each side at the apex; beneath with the scopa of a dull ochreous colour, paler at the sides and darker at the apex. Legs clothed with pale short ochreous hairs. Length, 12—18 mm.

*Hab.* Not a common species generally, but widely distributed. Dartford, Richmond, Hampton Court, Windsor, Chobham, Norfolk, Colchester, &c.

5. *Megachile ericetorum*, Lep. (Pl. IX., figs. 6—6 a).

Lep., Hist. Nat. Hym., ii., p. 341 = *pyrina*, Sm. (nec Lep.), Cat. Brit. Hym., 2nd ed. p. 174.

“♀. Length, 5—6 lines. Black; the face with bright golden yellow pubescence; on the vertex it is usually more or less fuscous. Thorax, the pubescence on the disk short and fuscous, on the sides and beneath pale fulvous, frequently inclining to cinereous; the apical joints of the tarsi ferruginous; the pubescence beneath the tarsi fulvous; the calcaria pale rufo-testaceous. Abdomen oblong, the two basal segments with thin pale pubescence, the following with fuscous; the apical margin of all the segments with entire fasciæ of pale fulvous pubescence, and beneath densely clothed with pale fulvous.

“♂. Length, 5 lines. The pubescence similar to that of the ♀, but longer and more dense on the face, the apical segment of the abdomen deeply emarginate in the middle, and denticulate at the sides; the 7th segment has a longish spine in the middle; the anterior coxæ have a blunt spine.”

I have not seen the British exponents of this species, so have copied Smith's description; but it is very distinct, and easily recognised by the pale tarsi of the male and the prominent tooth or spine on the 7th segment, and by the long banded abdomen of the ♀ (for genitalia see Pl. IX., figs. 6—6 a).

*Hab.* “This species has been captured at and near to Weybridge, Bristol, and Southampton. It must be very local. No one has been ascertained to have taken it for some years past.”

Smith is, I think, clearly wrong in referring this to *pyrina*, Lep., who says of the latter ♂ “les 4 premiers articles des tarses dilatés, blancs en dessus.”

6. *Megachile centuncularis*, Linn. (Pl. IX., figs. 5—5 a).

Linn., Syst. Nat., ed. x., i., p. 575; Smith, Cat. Brit. Hym., 2nd ed., p. 172.

Smaller than any of the preceding; ♂ front tarsi simple; apical crest of 6th abdominal segment almost entire; 7th segment entire, with a slight central tubercle; ♀ with the scopa bright orange-red.

♂. Head punctured; face clothed with bright brownish golden hairs; mandibles tridentate. Thorax very closely punctured, clothed on the disk with sooty brown hairs and round the sides

with brighter brown; wings slightly dusky, and with a rather darker apical margin. Abdomen rather shining, punctured, segments deeply impressed across the base; 1st and 2nd segments clothed with pale hairs, the rest clothed with black hairs at the base, but with an apical fringe on each side of pale brown hairs; apical crest of 6th segment very slightly emarginate; 7th with a triangular apical tubercle; beneath clothed with pale hairs; 5th segment shining, with a semicircular hairy patch in the middle of the apical margin; 6th very narrow, with scarcely any apical wing, and with the surface above the apex clothed with long simple hairs laterally adpressed (for genitalia, &c., see Pl. IX., figs. 5—5 a). Legs clothed with pale hairs.

♀. With the mandibles largely and rugosely punctured, only slightly flattened in front. Thorax clothed as in the ♂, but rather less densely, and with the hairs rather shorter. Abdomen rather strongly punctured; the base of the 2nd and 3rd segments deeply and narrowly impressed, the 1st and 2nd segments clothed with pale ochreous hairs; the remainder with short black hairs, upright on the apical as well as on the other segments; each segment with a narrow line of pale hairs on each side of the apex; scopa of the ventral segments bright orange. Legs clothed with pale hairs. Length, 10—12 mm.

*Hab.* The commonest species of the genus, and generally distributed.

### 7. *Megachile argentata*, Fab. (Pl. IX., figs. 7—7 a).

Fab., Ent. Syst., ii., p. 336; Smith, Cat. Brit. Hym., 2nd ed., p. 176.

Smaller than any of the preceding, black, clothed with ochreous-grey hairs; ♂ with the anterior tarsi simple, and the 6th segment of the abdomen densely clothed with adpressed whitish hairs, except a triangular spot at the apex; apical carina denticulate; ♀ with the ventral scopa silvery grey.

♂. Head and thorax closely punctured, the former broader or as broad as the latter; face densely clothed with silky golden grey hairs; mandibles shortly grooved at the apex, rugose and hairy at the base. Antennæ reaching to the scutellum, with the apical joint flattened, but scarcely dilated. Thorax densely clothed round its margins with ochreous-grey hairs, very closely punctured; wings slightly clouded. Abdomen finely punctured; 1st, 2nd, and 3rd segments densely clothed with rather long ochreous-grey hairs; 4th with shorter ones intermixed with black; 5th with black ones on its apical half; the 2nd, 3rd, and 4th with an apical fringe of

adpressed paler hairs, the 5th with a basal band of the same, and the 6th entirely so covered, except a small triangular region at the apex; apical crest of the 6th segment irregularly spined at each side and emarginate in the centre; 7th narrowly visible beneath; under side of the abdomen with the four basal ventral segments fringed with white hairs; 5th segment just visible at the sides, the rest hidden (for genitalia, &c., see Pl. IX., figs. 7—7 a). Legs clothed with ochreous-grey hairs; front femora slightly dilated, pale, and excavated beneath to receive the tibiæ; posterior tibiæ slightly swollen.

♀. Very like the ♂, but with the head narrower; the face clothed with short dull grey hairs. Antennæ shorter, not reaching the tegulæ. Abdomen with the two basal segments clothed with erect pale hairs, the remainder with very short black ones; the 2nd to 5th with apical bands of pale hairs, the 6th with a basal band; beneath with long greyish hairs, the extreme apical margins of the segments fringed with pale hairs, apical segment with black. Legs clothed with greyish hairs. Length, 9—11 mm.

*Hab.* A maritime species, and common in many places on the east and south coast.

#### OSMIA, *Panz.*

*Panz.*, *Krit. Rev.*, ii., p. 230.

Wings with two submarginal cells. Maxillary palpi 4-jointed; labial palpi 4-jointed; ♂ with the antennæ considerably longer than in the ♀; the 3rd ventral abdominal segment sometimes only visible at the sides; five segments usually exposed; 7th very thin and membranous; 8th narrowly triangular; genital armature very narrow and elongate (see Pl. VIII). ♀ with a dense ventral pollen-brush composed of simple hairs.

A genus which contains a large number of species, although only a few occur in this country; it has been divided into several sections, depending in many cases mainly on the male characters. Although these sections are natural enough, and some have characteristics which may be considered of generic value, I have not employed them here, as in a small fauna like ours I think it is probably more convenient to keep the species all together.

The habits of the species of this genus are most interesting; some of them make their cells of mud, and are amongst what are called the "mason bees"; for a good account of their habits see Smith, *Cat. Brit. Hym.*, 2nd ed., p. 147.

- (2) 1. ♂ antennæ very long, not hairy, extending to beyond the scutellum; ♀ with two stout projecting horns on the face .. .. . *rufa*.
- (1) 2. ♂ antennæ either pilose beneath, or else not nearly extending to the scutellum; ♀ face simple.
- (12) 3. Calcaria of posterior tibiæ black.
- (9) 4. Ground colour of body black.
- (8) 5. ♂ posterior metatarsi more or less dilated towards the apex inwardly; apex of abdomen bidentate; ♀ face with black hairs, and with fulvous on the two basal abdominal segments.
- (7) 6. ♂ antennæ pilose beneath; ♀ face sparingly clothed with black hairs; posterior metatarsi scarcely more than twice as long as broad .. *pilicornis*.
- (6) 7. ♂ antennæ not pilose; ♀ face densely clothed with black; posterior metatarsi much more than twice as long as broad. .. .. . *xanthomelana*.
- (5) 8. ♂ posterior metatarsi simple, apex of abdomen entire; ♀ with face clothed with pale hairs, and basal segment only of abdomen with fulvous .. .. . *parietina*.
- (4) 9. Body more or less metallic.
- (11) 10. ♂ 6th segment very slightly notched at the apex, and somewhat crenulate on each side of the notch; ♀ scopa black .. .. . *cærulescens*.
- (10) 11. ♂ 6th segment rather widely notched at the apex, its sides simple; ♀ scopa red .. .. . *fulviventris*.
- (3) 12. Calcaria of posterior tibiæ pale.
- (14) 13. ♂ margin of 6th segment entire; ♀ head and thorax densely clothed with black hairs .. *bicolor*.
- (13) 14. ♂ margin of 6th segment denticulate at the sides; ♀ head and thorax clothed with brown or pale hairs.
- (16) 15. Segments of abdomen fringed with golden hairs *aurulenta*.
- (15) 16. Segments of abdomen not fringed with golden hairs.
- (18) 17. ♂ with a sharp tooth on the basal segment beneath; ♀ scopa fulvous .. .. . *spinulosa*.
- (17) 18. ♂ with a broadly-elevated tubercle on the 2nd segment beneath; ♀ scopa greyish .. .. . *leucomelana*.

1. *Osmia rufa*, Linn. (Pl. VIII., fig. 9).

Linn., Syst. Nat., ed. x., i., p. 575; Smith, Cat. Brit. Hym., 2nd ed., p. 152.

Head and thorax clothed with greyish brown hairs, face of the ♀ with black. Abdomen entirely clothed with orange-red hairs; face of the ♀ with two thick, usually bifid, horns below the antennæ on each side of the clypeus.

♂. Head and thorax greenish black, closely and finely punctured; face clothed with whitish hairs below the antennæ, with

rather darker hairs above. Antennæ long, reaching to the scutellum. Thorax clothed with long brownish grey hairs; wings slightly clouded. Abdomen more or less æneous, closely punctured, densely clothed with long orange-coloured hairs; 7th segment narrowly truncate at the apex; beneath with the 2nd segment very long, punctured, rounded at the apex; 3rd segment visible only at the sides, its apical margin widely emarginate; 4th segment with its apical margin rounded and slightly reflexed; 5th segment just visible at the apex, shaped like the 4th; 6th entirely hidden, rather pointed at the apex; 7th corneous only at the sides, the centre entirely membranous; 8th narrowly pointed (for genitalia see Pl. VIII., fig. 9). Legs clothed with brownish grey hairs.

♀. Larger than the ♂. Head clothed with black hairs. Antennæ reaching to about the tegulæ; on each side of the clypeus is a thick horn, slightly bifid at the apex, the inner tooth produced and slightly bent towards the centre; mandibles deeply grooved and rugosely punctured. Thorax clothed with greyish brown hairs, its surface more or less greenish and closely and finely punctured. Abdomen æneous, punctured, clothed with dense orange-coloured hairs; beneath with the scopa almost of the same colour; femora clothed with greyish hairs, tibiæ and tarsi with orange. Length, 10—15 mm.

*Hab.* Very common; appears in May.

## 2. *Osmia pilicornis*, Smith. (Pl. XI., fig. 4).

Smith, Zool., iv., 1567; Cat. Brit. Hym., 2nd ed., p. 158 = *fuciformis*, Smith (nec Gerst.).

♂ clothed with pale hairs, its antennæ long, with fine projecting hairs beneath; ♀ with the face clothed with black hairs; metathoracic area dull; 1st and 2nd abdominal segments clothed with brown hairs, the rest with black.

♂. Head and thorax black, closely punctured, clothed with ochraceous grey hairs. Antennæ reaching to beyond the metathorax; each joint beneath with several fine silvery hairs; wings slightly dusky, nervures brown. Abdomen black, clothed with greyish hairs, shining, rugosely punctured at the base of the segments, impunctate and glabrous at the apex, apex of each more or less testaceous; 6th segment sharply emarginate; 7th very deeply so; beneath 2nd segment very long; 3rd visible only at the sides; 4th somewhat truncate at the apex, its centre clothed with hairs with their apices hooked; the rest hidden. Legs clothed with grey hairs; posterior tibiæ slightly incrassate; posterior metatarsi widened and produced inwardly at the apex (for genitalia see Pl. XI., fig. 4).



♀. Face clothed rather sparingly with black hairs, vertex with brown. Thorax with bright brown hairs; metathoracic area dull. Abdomen shining, rather more finely punctured than in the ♂; 1st and 2nd segments clothed with brown hairs like the thorax, the remainder with black; beneath with the scopa black. Legs clothed with black hairs; posterior metatarsi short, about three times as long as wide. Length, 9—10 mm.

*Hab.* Local. Bristol, Leigh Woods and Durdham Downs; Birchwood, Kent; Colchester.

### 3. *Osmia xanthomelana*, Kirb. (Pl. VIII., fig. 8).

Kirb., Mon. Ap. Angl., ii., p. 246; Smith, Cat. Brit. Hym., 2nd ed., p. 155 = *fuciformis*, Gerst. (nec Sm.).

Thorax and abdomen entirely clothed with fulvous hairs in the ♂. Antennæ reaching to about the tegulæ; apical segment of abdomen deeply notched; ♀ with the face densely clothed with black hairs; thorax and first two abdominal segments with fulvous; the other segments, as well as the scopa and legs, with black.

♂. Head and thorax black, closely punctured; face clothed with pale hairs; mandibles with a tooth on the inner margin. Antennæ reaching to about the tegulæ. Thorax clothed with bright fulvous hairs; wings clouded, especially over the radial cell; nervures piceous, paler at the base; metathoracic area shining. Abdomen finely punctured, densely clothed with fulvous hairs; the extreme apex of each segment impunctate, glabrous and shining; 7th segment deeply emarginate at the apex; beneath clothed with black hairs, 2nd segment angulated at the apex; the 3rd emarginate at the apex, the emargination fringed with golden hairs; 4th rounded at the apex, clothed with hairs recurved at the apex; 5th only visible at the extreme sides (for genitalia see Pl. VIII., fig. 8). Legs clothed with pale fulvous-grey hairs; posterior metatarsi inwardly produced into a slight tubercle.

♀. Rather stouter than the ♂, the head larger and more quadrate, the antennæ short, the face densely clothed with black hairs, the thorax with dark fulvous, paler below the wings; wings and metathorax as in the ♂. Abdomen clothed with fulvous hairs on the first two segments, slightly paler at the apex of each, and with black hairs on the other segments; beneath entirely clothed with black hairs, the hairs of the scopa in certain lights with a fulvous tinge. Legs clothed with black hairs, those of the tarsi fulvous beneath; posterior metatarsi rather longer than in the preceding species. Length, 12 mm.

*Hab.* Local; appears early in May. Somersham, near Ipswich; Darent Wood; near Liverpool; near Bristol, frequenting ground-ivy.

Easily distinguished from the preceding by the shining area of the metathorax.

4. *Osmia parietina*, Curt. (Pl. VIII., fig. 11).

Curt., Brit. Ent., v., p. 222, pl. 222, ♀; Smith, Cat. Brit. Hym., 2nd ed., p. 157 = *vulpecula*, Gerst. ?

Black; face in both sexes with pale hairs. Thorax and 1st segment of abdomen with fulvous hairs; ♂ with the 7th segment of the abdomen entire; calcaria black.

♂. Head and thorax closely punctured, the former clothed with whitish hairs below the antennæ and with dull fulvous hairs above. Antennæ reaching to the base of the scutellum. Thorax clothed with bright fulvous hairs; wings slightly clouded; metathoracic area dull, finely rugose. Abdomen shining, subglobose, finely punctured; basal segment clothed with long fulvous hairs, the rest with black and fulvous hairs intermixed; 6th and 7th segments entire at the apex; beneath punctured, 2nd segment narrowly emarginate in the centre; 3rd visible only at the sides; 4th hairy at the apex, rest hidden (for genitalia see Pl. VIII., fig. 11). Legs clothed with pale hairs; calcaria black; posterior metatarsi simple.

♀. Face clothed with pale fulvous hairs, thorax with bright fulvous; metathoracic area dull. Abdomen with the basal segment clothed with fulvous hairs, the rest with black; the apical segment with paler hairs intermixed; beneath with the scopa black. Legs clothed with black hairs, paler beneath. Length, 8 mm.

*Hab.* Ambleside, Westmoreland; Bridgend, Glamorgan; Loch Rannoch; Grampian Hills; F. Smith. I have never met with this species.

Very distinct by the simple apex of the abdomen of the ♂ and the coloration of the pubescence in the ♀.

5. *Osmia cærulescens*, Linn. (Pl. VIII., fig. 13).

Linn., Syst. Nat., ed. x., i., p. 576 = *ænea*, Smith, Cat. Brit. Hym., 2nd ed., p. 153.

Æneous or bluish. Abdomen of the ♂ short and subovate; 6th dorsal segment simple or very slightly emarginate; 7th bidentate; ♀ with the metathoracic area dull; scopa black.

♂. Head and thorax bronzy, or sometimes with bluish tints, closely punctured, clothed with pale brownish hairs. Antennæ reaching about to the tegulæ; wings slightly dusky; metathorax finely rugose at the base, with a smooth space below. Abdomen brassy or blue, fringed at the sides and ends of the segments with ochreous hairs, deeply and largely punctured; 6th segment entire or obsoletely emarginate; 7th bidentate; beneath with the 2nd segment almost entire; the 3rd largely emarginate, its emargination fringed with long hairs; 4th and 5th entire (for genitalia see Pl. VIII., fig. 13). Legs clothed with pale brownish hairs; calcaria black.

♀. Blue; head and thorax dull, clothed with greyish hairs; vertex subquadrate, as wide as the thorax; metathoracic area dull. Abdomen shining, strongly punctured; 2nd and following segments with a very narrow apical fringe of whitish hairs; beneath with the scopa black. Legs clothed with short pale hairs; calcaria black. Length, 7—10 mm.

*Hab.* Common, and generally distributed in May and June.

#### 6. *Osmia fulviventris*, Panz. (Pl. VIII., fig. 15).

Panz., Faun. Germ., 56, 18; Smith, Cat. Brit. Hym., 2nd ed., p. 154.

♂ more or less bronzy, ♀ nearly black; thorax and head obscure greenish; ♂ abdomen subelongate; ♀ scopa bright orange; abdomen shining, without pubescent bands.

♂. Head and thorax bronzy green, densely punctured, and clothed with long pale brown hairs. Antennæ reaching not quite to the scutellum; wings rather dusky; metathorax rugose at the base, the triangular area shining towards the apex. Abdomen bronzy, subelongate, shining, largely punctured, sparsely clothed with long ochreous hairs, forming dense bands at the apex of each segment; 6th segment piceous and emarginate at the apex; 7th bidentate; beneath punctured, 2nd segment slightly emarginate, 3rd largely so, and the emargination fringed with long golden hairs; the others entire (for genitalia see Pl. VIII., fig. 15). Legs clothed with pale hairs; calcaria dark piceous.

♀. Head and thorax dull, greenish black, sparingly clothed with ochreous-grey hairs, and closely and deeply punctured; vertex subquadrate; clypeus emarginate at the apex; wings smoky brown. Abdomen shining, black, with a greenish tinge, largely punctured, almost glabrous above on the 2nd and 3rd segments; extreme sides of the segments fringed with orange-yellow hairs; 6th segment

dull and closely punctured; beneath with the scopa bright orange. Legs clothed with pale hairs. Length, 9—10 mm.

*Hab.* Generally distributed, and tolerably abundant in some localities; makes its nest in wooden posts, &c.

7. *Osmia aurulenta*, Panz. (Pl. VIII., fig. 10).

Panz., Faun. Germ., 63, 22; Smith, Cat. Brit. Hym., 2nd ed., p. 159.

♂ clothed with greyish hairs, and with bright golden fringes to the apical segments of the abdomen; ♀ clothed on the thorax with brownish red hairs; all the segments of the body fringed with the same; scopa red.

♂. Subelongate. Head and thorax black, with a slight metallic tinge, closely punctured; face clothed with long pale hairs. Thorax clothed with brownish grey hairs; metathoracic area dull. Abdomen slightly shining, punctured; basal segment clothed with long grey hairs, the remainder with their apical margins fringed with bright golden hairs, the fringes wider on the apical segments; 6th segment dentate and sinuate at the sides, slightly rounded at the apex; 7th sharply bidentate; beneath punctured, 3rd segment visible at the apex, emarginate, the emargination fringed with long golden hairs; 4th segment entire, rather angular at the apex; 5th sinuate at the apex; 6th entire (for genitalia see Pl. VIII., fig. 10). Legs clothed with greyish hairs.

♀. Stouter than the ♂, punctured as in that sex; head sparingly clothed with greyish brown hairs; thorax densely with fulvous-brown. Abdomen clothed with short fulvous hairs, sides and apices of the segments with longer, giving a distinct fringe to each; beneath, scopa red-brown. Legs clothed with pale fulvous hairs; calcaria pale. Length, 9—11 mm.

*Hab.* Common in many localities, and generally distributed, but, according to Smith, does not extend far north.

8. *Osmia bicolor*, Schrank. (Pl. VIII., fig. 14).

Schrank, Ins. Austr., p. 400; Smith, Cat. Brit. Hym., 2nd ed., p. 160.

Black; ♂ clothed with ochreous hairs; ♀ with black hairs on the head and thorax, and bright red hairs on the abdomen; ♂ with the 7th segment bidentate; the 4th segment beneath bearing a small pubescent tubercle on its disk.

♂. Head and thorax closely punctured; face clothed with pale ochreous-yellow hairs; antennæ reaching to the tegulæ, with the 3rd joint longer than the two following together. Thorax clothed with long ochreous hairs; wings slightly smoky; metathoracic area dull. Abdomen shining, finely punctured, the apical margins of the segments very narrowly piceous, their surface clothed with long pale ochreous hairs; 7th segment sharply bidentate; beneath punctured, clothed with long ochreous hairs, margins of the segments testaceous; 2nd segment rounded at the apex; 3rd emarginate; 4th truncate, with a small discal pubescent tubercle; 5th truncate; 6th shining, with a tuft of golden hairs on each side of its apex (for genitalia see Pl. VIII., fig. 14). Legs clothed with pale hairs; calcaria testaceous; tarsi testaceous, except the basal joint, and clothed with golden hairs.

♀. Head and thorax densely clothed with black hairs. Antennæ with the 3rd joint very long, as in the ♂, being nearly as long as the three following joints taken together. Abdomen densely clothed with bright red hairs above and beneath, rather darker towards the base. Legs clothed with black hairs on the femora, with brownish hairs on the tibiæ, and bright fulvous-red on the tarsi, which are clear rufo-testaceous; calcaria testaceous. Length, 10—12 mm.

*Hab.* Purfleet, Northfleet, Reigate, Bristol, Wotton-under-Edge, &c. Local, but not uncommon where it occurs.

### 9. *Osmia leucomelana*, Kirb. (Pl. VIII., fig. 16).

Kirb., Mon. Ap. Angl., ii., p. 260; Smith, Cat. Brit. Hym., 2nd ed., p. 161.

Deep black, shining; ♂ with the 7th segment pointed, deeply foveated at the base; 2nd segment beneath with a large transverse tubercular plate; ♀ with the 1st to 4th segments with an apical band of white hairs on each side.

♂. Head and thorax finely punctured, clothed with ochreous-grey hairs, those of the face below the antennæ paler and very dense. Antennæ piceous beneath, not reaching to the tegulæ. Thorax dull; wings very slightly smoky in colour; nervures and tegulæ piceous. Abdomen incurved at the apex, somewhat shining, punctured, clothed with a short grey pubescence, forming indistinct apical bands on the 2nd and following segments; 6th segment with an obtuse apical tooth on each side; 7th pointed, with a large deep round fovea at the base; beneath with the 2nd segment elevated into a large perpendicular tubercular plate, 3rd, 4th, and 5th

emarginate, and fringed with golden hairs (for genitalia see Pl. VIII., fig. 16). Legs clothed with pale hairs; tarsi piceous.

♀. Head and thorax closely punctured; face below the antennæ with white hairs at the sides, and with yellowish hairs on the apex of the clypeus, which is emarginate. Thorax somewhat shining, clothed round the margins, in fresh examples, with pale brownish hairs; scutellum with brownish hairs; metathoracic area dull. Abdomen shining, coal-black, strongly punctured; 1st to 4th segments with a lateral streak of silvery hairs at the apex; beneath with the scopa ochreous-grey. Legs clothed with pale hairs, tarsi internally with golden; calcaria pale. Length, 8—9 mm.

*Hab.* This pretty little species is rare, and has been recorded from Charlton, Kent; Hawley, Hants; Chobham, Weybridge, and Charlwood, Surrey; near Exeter; Leigh Woods, Bristol; Coddham, near Needham Market, Suffolk. It makes its nest in dead bramble-stems.

10. *Osmia spinulosa*, Kirb. (Pl. VIII., fig. 12).

Kirb., *Mon. Ap. Angl.*, ii., p. 261, pl. xvii., 1 & 2; Smith, *Cat. Brit. Hym.*, 2nd ed., p. 162.

Small, black, clothed with brownish hairs; ♂ with the 6th segment rounded and denticulate; beneath with a long spine on the disk of the 1st segment, and a smaller one on the 2nd near the apex; ♀ with a pale pubescent streak at the apex of the 4th, 5th, and 6th segments; scopa beneath orange.

♂. Head and thorax closely and largely punctured, densely clothed with brown hairs. Antennæ not quite reaching to the tegulæ; 3rd joint short, not much longer than the 4th; wings slightly clouded; nervures dark piceous; metathoracic area slightly shining towards the apex. Abdomen slightly shining, largely punctured; sides of the segments and an apical line on the 3rd, 4th, and 5th, clothed with pale ochreous hairs; 6th segment rounded at the apex, with numerous small spine-like teeth on its margin; 7th produced into a sharp point; beneath with the 1st segment bearing a strong upright central spine; 2nd with a narrow short subapical spine; 3rd visible only at the sides; 4th and 5th entire (for genitalia see Pl. VIII., fig. 12). Legs clothed with pale hairs; calcaria pale.

♀. Very like the ♂ in general appearance, but with the head and thorax less densely hairy, and the hairs shorter and greyish. Abdomen shorter, with an apical line of pale hairs on the 4th, 5th, and 6th segments; beneath with the scopa bright orange-red. Length, 7—8 mm.

*Hab.* Common in many places. Deal, Walmer, Dover, Reigate, Croydon, Hastings, Isle of Wight, Sidmouth, Norwich.

## CHELOSTOMA, Latr.

Latr., Gen. Crust. et Ins., iv., p. 161.

Elongate, subparallel-sided; wings with two submarginal cells; labial palpi 4-jointed, the apical joint much shorter than 3rd; maxillary palpi 3-jointed. Abdomen with the 1st segment not carinated at the base, where the perpendicular portion meets the horizontal; five ventral segments exposed in the ♂, the 2nd bearing a well-defined tubercle or raised line; 5th segment with a long curved apical fringe; genital armature with the stipites long and straight, much thickened at the apex (see Pl. X.); ♀ with a dense ventral pollen-brush composed of hairs with very fine filamentary branches.

- (2) 1. ♂ thorax densely hairy; ♀ abdominal segments with white pubescent apical bands .. .. *florisomne*.  
 (1) 2. ♂ thorax not densely hairy; ♀ abdominal segments not banded .. .. *campanularum*.

1. *Chelostoma florisomne*, Linn. (Pl. X., figs. 4—4a).

Linn., Syst. Nat., ed. x., i., p. 577; Smith, Cat. Brit. Hym., 2nd ed., p. 165.

Elongate, black; ♂ clothed with rather long grey hairs. Abdomen incurved at the apex; 2nd segment beneath with a large tubercle, flattened and shining on its ventral surface; ♀ with the head large and quadrate, the mandibles strong; segments of the abdomen posteriorly fringed with white hairs.

♂. Head and thorax closely punctured, clothed rather densely with long brownish grey hairs; mandibles grooved, simple at the apex. Antennæ with the 3rd to 7th joints produced beneath into prominent angles. Wings slightly clouded. Abdomen elongate, densely punctured, clothed with long grey hairs, and with shorter whitish ones on each side of the apex of the segments; 7th segment terminating in two somewhat quadrate teeth, with a strong impression between them; beneath with the 2nd segment produced into a large tubercle, flattened and somewhat excavated on its lower surface, and pointed towards the base of the abdomen; 3rd segment excavated and very shining; 4th densely clothed with pale hairs; 5th hairy at the base, its apex with a fringe of long bent hairs, each hair knotted at intervals, except at the base; 6th shining, slightly excavated, its apex rounded; 7th shining, with

only a very short horny portion at the apex; 8th pointed at the apex (for genitalia, &c., see Pl. X., figs. 4—4 a). Legs clothed with grey hairs.

♀. Head and thorax somewhat shining, punctured, the former very large and quadrate on the vertex; mandibles curved, deeply grooved and bidentate at the extremities, densely fringed with golden hairs on their inner margins; labrum prominent, shining. Antennæ short, subclavate. Abdomen elongate, deeply punctured; apical margin of each segment with a narrow band of white adpressed hairs; scopa beneath yellowish white. Legs clothed with pale hairs. Length, 10 mm.

*Hab.* Common in most places, making its nests in posts, &c.

## 2. *Chelostoma campanularum*, Kirb. (Pl. X., figs. 5—5 b).

Kirb., *Mon. Ap. Angl.*, ii., p. 256; Smith, *Cat. Brit. Hym.*, 2nd ed., p. 166.

Small, black, elongate. Antennæ simple in the ♂; 2nd segment of the abdomen beneath raised in the centre; ♀ with the abdominal segments entirely black, without apical pubescent bands.

♂. Entirely black; head and thorax largely punctured, sparingly clothed with brownish grey hairs, but more densely on the face below the antennæ; wings slightly clouded; metathorax radiately rugose at the base. Abdomen slightly incurved at the apex, largely punctured; 7th segment terminating in two blunt teeth; beneath shining, punctured, 2nd and following segments more or less pale and membranous at the apex; 5th with an apical fringe of long curved hairs; 6th shining and somewhat pointed at the apex; 7th almost entirely membranous in the centre, but hard and horny at the sides, and with a few scattered hairs; 8th subquadrate, with a few apical hairs (for genitalia, &c., see Pl. X., figs. 5—5 b). Legs clothed with short hairs.

♀. Very like the ♂, but with the antennæ shorter and subclavate, the vertex more quadrate, and the abdomen simple at the apex, its under side clothed with a dense yellowish red scopa. Length, 6—7 mm.

*Hab.* Common in many places, often frequenting *Campanula rotundifolia*, June and July.

## HERIADES, *Spin.*

*Spin.*, *Ins. Lig.*, fasc. ii., p. 7.

Very like the preceding genus, but differing in having the basal segment of the abdomen carinated at its base, and the 3rd joint of



the labial palpi about equal to the 4th in length; ♂ with five ventral segments generally more or less visible, the 5th with a lateral spinose process on each side; genitalia with the stipites long and slender, slightly curved, but scarcely thickened at the apex.

1. *Heriades truncorum*, Linn. (Pl. X., figs. 1—1 a).

Linn., Syst. Nat., ed. x., i., p. 575; Smith, Cat. Brit. Hym., 2nd ed., p. 163.

Small, black, very largely and rugosely punctured; 1st segment of the abdomen carinated semicircularly at its base; apex of the abdomen rounded in both sexes.

♂. Black; head and thorax very largely punctured, clothed sparingly with brownish hairs; face rather densely clothed with pale hairs; mandibles broad at the apex and bidentate; antennæ rather long; the apical joint of each slightly flattened; wings rather clouded; metathorax shining, crenulate at the base. Abdomen with the 1st segment transversely and sharply carinated, its base nearly perpendicular and shining, its dorsal surface deeply punctured and dull like the other segments; 1st and 2nd segments with a line of white hairs at the apex; apex of the abdomen incurved, simple; beneath with only two segments visible, the 2nd densely hairy; 3rd and 4th slightly emarginate at the apex; 5th denticulate at the sides, the centre of the apex submembranous; 6th pointed with a slightly projecting central process; 7th nearly entirely membranous; 8th long and tongue-like, more or less hairy (for genitalia, &c., see Pl. X., figs. 1—1 a). Legs clothed with silvery hairs.

♀. Very like the ♂. Abdomen not inflected at the apex, with the first five segments banded with white hairs at the apex; beneath with a dense reddish yellow scopa. Length, 6—7 mm.

*Hab.* Very rare; the only recorded localities are Brentford (*Kirby*), and Dulwich (*Ingall*).

STELIS, *Panz.*

*Panz.*, Krit. Rev., ii., p. 246.

Wings with two submarginal cells; maxillary palpi 2-jointed; labial palpi 4-jointed; ♂ with the apex of the abdomen simple; five ventral segments exposed; 6th rounded at the apex; 7th very narrow and fragile; 8th broad and subquadrate, with a slight apical projection; genital armature with the stipites thickened at the apex and somewhat square (see Pl. X., fig. 2); ♀ without any observable pollen-brush.

- (4) 1. Abdomen unspotted.  
 (3) 2. Posterior margins of the first four abdominal segments pale .. .. . *aterrima*.  
 (2) 3. Posterior margins of segments not pale .. .. . *phaeoptera*.  
 (1) 4. Abdomen spotted at the sides .. .. . *octomaculata*.

1. *Stelis aterrima*, Panz. (Pl. X., fig. 2).

Panz., Faun. Germ., 56, 15; Smith, Cat. Brit. Hym., 2nd ed., p. 138.

Black; head and thorax closely punctured, dull. Abdomen slightly shining, strongly punctured, the posterior margins of the segments narrowly pale testaceous.

♂. Black; head and thorax largely and rugosely punctured, and clothed sparingly with greyish hairs; tegulae black; wings dusky, and with the anterior portion of the radial cell brown; scutellum with an angular tooth at the base on each side. Abdomen slightly shining, sparingly clothed with short greyish hairs, largely and deeply punctured, the posterior margins of the segments narrowly pale testaceous; 6th segment rounded at the apex; 7th only visible from the ventral side; beneath with only the basal four segments visible, the 2nd, 3rd, and 4th being densely fringed at the apex with long golden hairs; the 4th is visible only at its apex; the 5th and 6th are excavated on their ventral surface and clothed with golden hairs; the 8th is testaceous and produced at the apex into two little round processes (for genitalia see Pl. X., fig. 2). Legs clothed with short grey-brown hairs.

♀. Almost exactly like the ♂, but the abdomen beneath simple, showing the ordinary six segments, largely and irregularly punctured, and sparsely clothed with golden brown hairs. Length, 8—9 mm.

*Hab.* Not common. Hastings; Southwold; Deal; Weybridge; Birchwood, Kent; Ilfracombe; Sidmouth; Clifton, near Bristol; Norwich; Barham. F. Smith says it is parasitic on *Osmia fulviventris*, and probably also on *aurulenta*; is found sometimes in the flowers of the mallow.

2. *Stelis phaeoptera*, Kirb.

Kirb., Mon. Ap. Angl., ii., p. 232; Smith, Cat. Brit. Hym., 2nd ed., p. 139.

Exceedingly like the preceding, but differs in both sexes by the rather more shining thorax, its puncturation not being quite so close on the disk as that of *aterrima*, and by the entirely black abdomen, the apices of the segments of which are not discoloured

as in that species; also by the teeth of the scutellum being scarcely observable. Length, 8—9 mm.

*Hab.* Rare. I have never had the good fortune to capture it myself, but F. Smith says it is local and parasitic on *Osmia fulviventris*, and that it appears in June, and may be taken in July and August. He gives Battersea, Hammersmith, and Fulham as ancient localities for it. It has also been taken at Exeter, Norwich, and in Hampshire.

Unfortunately I have been unable to procure a ♂ for dissection.

### 3. *Stelis octomaculata*, Smith.

Smith, Zool., iii., p. 1155; Cat. Brit. Hym., 2nd ed., p. 140.

Smaller than either of the preceding and less coarsely punctured, and at once distinguished by the yellow spots of the abdomen, of which there are two oval ones on the basal and 2nd segments, an elongate spot on each side of the 3rd and 4th in the ♀, those of the 4th divided into two spots on each side in the ♂, and there is a spot on the 5th in the latter sex. These spots are doubtless very variable, as I have a variety of the ♂ from Holland which has only a round spot on each side of the 2nd and 3rd segments. Length, 6—7 mm.

*Hab.* Very rare; parasitic on *Osmia leucomelana*. Hawley, Hants; Exeter and Sidmouth, Devon.

The species is so rare that I can give no dissections of the ♂.

### ANTHIDIUM, *Fabr.*

Fabr., Syst. Piez., p. 364.

Wings with two submarginal cells; maxillary palpi 2-jointed; labial palpi 4-jointed. Abdomen with yellow spots; ♂ with the 7th dorsal abdominal segment more or less spinose; six ventral segments exposed; 7th rounded at the apex, the basal angles very much produced; 8th produced at the apex into a narrow central process; genital armature with the stipites short and curved (see Pl. X., fig. 3); ♀ with a ventral pollen-brush composed of simple hairs.

1. *Anthidium manicatum*, Linn. (Pl. X., figs. 3—3 a).

Linn., Syst. Nat., ed. x., i., p. 577 ; Smith, Cat. Brit. Hym., 2nd ed., p. 168.

Black ; clothed with yellowish grey hairs ; face and abdomen with yellow spots ; 6th and 7th segments in the ♂ with large lateral spines at the apex ; ♀ with the abdomen simple, the scopa beneath golden,

♂. Head and thorax black, closely punctured, clothed with short yellowish brown hairs ; mandibles, except at the apex, a bilobate spot on the clypeus, the cheeks below the antennæ, and a small spot behind each eye, yellow. Thorax with the tegulæ yellow in front ; wings slightly dusky. Abdomen black, clothed with erect greyish hairs, and with a rather denser band of browner hairs at the apex of each segment, and a tuft of the same along the lateral margins of each ; all the segments, except the 7th, with a yellow spot on each side ; the 4th and 5th often with a second pair of spots on the disk ; 6th and 7th segments spined on each side at the apex, the 7th with a third very fine spine in the centre. Abdomen beneath clothed with grey hairs (for 8th segment and genitalia see Pl. X., figs. 3—3 a). Legs variegated with yellow, and clothed with silvery grey hairs.

♀. Smaller than the ♂, but coloured almost similarly, the spots of the abdomen smaller, its apex simply rounded, and the under side bearing a dense golden scopa. Legs almost entirely black, with only very small yellow spots. Length, 11—16 mm.

*Hab.* Very common in many localities, frequenting labiate plants.

EUCERA, *Scop.*

*Scop.*, Ann. Hist. Nat., iv., 8.

Wings with two submarginal cells ; labial palpi 4-jointed ; maxillary palpi 6-jointed ; 2nd joint of labial palpi not half so long as the 1st. Antennæ of the ♂ very long, reaching nearly to the apex of the abdomen. Thorax densely hairy ; metatarsi of ♀ dilated on their external margins ; ♂ with six ventral segments exposed ; genital armature stout, the stipites produced into long narrow bent processes (see Pl. X., fig. 6).

1. *Eucera longicornis*, Linn. (Pl. X., figs. 6—6 b).

Linn., Syst. Nat., ed. x., i., p. 574 ; Smith, Cat. Brit. Hym., 2nd ed., p. 183.

Black ; head and thorax densely clothed with brown hairs ; clypeus of the ♂ white. Antennæ very long, reaching to the 4th abdominal segment ; ♀ with the antennæ short, reaching to about

the tegulæ. Abdomen with a lateral spot of pale pubescence on the 2nd and 3rd segments, and an entire apical band on the remaining segments.

♂. Head and thorax punctured, densely clothed with bright brown hairs (when fresh); clypeus and labrum yellowish white. Antennæ very long, reaching to about the 4th abdominal segment; joints slightly curved. Thorax with the hairs of the disk rather darker than those of the sides beneath the wings; wings slightly clouded. Abdomen with the first two segments clothed with long brown hairs, the rest with short black ones, but occasionally with an apical band of pale hairs on each; apical segment narrow and truncate; beneath punctured, apical margins of the segments smooth and piceous; 6th segment with an elevated line running parallel to the margin on each side; 7th with a black projecting, somewhat quadrate tubercle at the apex on each side; 8th shining, its apex slightly emarginate, and with a few hairs on each side (for genitalia, &c., see Pl. X., figs. 6—6*b*). Legs clothed with pale hairs; calcaria pale.

♀. Quite unlike the ♂ in general appearance, and something like an *Anthophora* in shape. Head and thorax densely clothed with brown hairs, paler on the face and below the wings; labrum and clypeus black; mandibles piceous at the apex. Antennæ reaching to about the tegulæ; 3rd joint about as long as the 4th and 5th together; wings as in the ♂. Abdomen ovate, punctured; basal segment and base of 2nd clothed with erect pale brown hairs, the rest of the 2nd and the 3rd with very short black ones, having a lateral somewhat triangular spot of pale hairs on each side; 4th segment densely clothed with velvety brown hairs at the base (usually covered by the preceding segment), and with an apical band of pale hairs; 5th with an apical band of golden hairs; 6th with the central glabrous space transversely rugose; beneath clothed with pale hairs, becoming golden towards the apex. Legs clothed with pale brown hairs, tarsi inwardly with golden brown hairs. Length, 15—16 mm.

*Hab.* Abundant in some places, and generally distributed.

#### ANTHOPHORA, *Latr.*

*Latr.*, *Nouv. Dict. d'Hist. Nat.*, ix., p. 167.

Wings with three submarginal cells; labial palpi 4-jointed; maxillary palpi 6-jointed. Antennæ of the ♂ scarcely longer than those of the ♀; clypeus and labrum in the ♂ white; posterior metatarsi of the ♀ outwardly dilated, and the posterior tibiæ in this sex with a dense pollen-brush. ♂ with six ventral segments exposed; 7th subquadrate, with long posterior branches; 8th short,

subtruncate at the apex; genital armature stout, the sagittæ strong and forcipate (see Pl. X., XI).

There are two distinct divisions in this genus: in one the males have the intermediate tarsi more or less produced, and densely clothed with hairs on one or more joints; in the other they have them simple: *retusa* and *pilipes* belong to the 1st division, *furcata* and *quadrimaculata* belong to the 2nd. *A. retusa*, ♂, is further distinguished from the males of our other species in having the posterior tibiæ furnished with a patella at the base.

1. *Anthophora retusa*, Linn. (Pl. X., figs. 7—7 b).

Linn., Syst. Nat., ed. x., i., p. 575; Smith, Cat. Brit. Hym., 2nd ed., p. 189 = *Haworthana*, Kirb.

Head and thorax and first two segments of the abdomen in the ♂ clothed with fulvous-brown hairs, the rest of the abdomen with black; ♀ entirely clothed with black hairs; calcaria pale; intermediate tarsi in the ♂ with the 1st joint only, densely clothed with projecting black hairs.

♂. Face clothed with pale hairs; labrum and clypeus and sides of the face below the antennæ yellowish white, base of the clypeus with two dark spots, separated by a narrow intervening pale line. Antennæ with the scape pale in front; vertex of the head clothed with fulvous-brown hairs. Thorax rather closely punctured, densely clothed with fulvous-brown hairs, which are rather paler round its edges; wings very slightly dusky. Abdomen punctured, with the first two segments clothed as the thorax; the 3rd to the 7th clothed with black hairs, with a rather paler fringe of hairs at the apex; 7th narrow, truncate at the apex, and longitudinally rugose; beneath rather shining, clothed with grey and black hairs; 7th segment shining, dilated, thickened and truncate at the apex; 8th bidentate, with long apical hairs (for genitalia, &c., see Pl. X., figs. 7—7 b). Legs with the femora and tibiæ clothed with pale brownish hairs; calcaria pale; tarsi testaceous, intermediate pair with the basal joint densely clothed with projecting black hairs, the remaining joints with only a few pale spinose hairs at the apex; posterior pair with the basal joint black and clothed with black hairs, except at the extreme apex, where the hairs are golden; the rest of the joints testaceous.

♀. Entirely black and clothed with black hairs, except the pale calcaria and the posterior tibiæ and tarsi, which have outwardly a dense golden scopa; mandibles bifid at the apex, the teeth rounded, the outer one not much longer than the inner; face transverse,

much wider across the eyes than long; surface of thorax and abdomen very finely punctured. Length, 15—16 mm.

*Hab.* Generally distributed, and common in many places.

2. *Anthophora pilipes*, Fab. (Pl. X., figs. 8—8 b).

Fab., Syst. Ent., p. 383 = *acervorum*, Smith, Cat. Brit. Hym., 2nd ed., p. 190 = *retusa*, Kirb. (nec Linn).

Very like the preceding, especially in the ♀, but differs in the following characters:—

♂. With the pubescence longer and of a less rich brown, more inclined, especially in faded examples, to a greenish grey tint; clypeus nearly entirely pale; alar hooks of posterior wings 20 to 22 instead of only about 15 to 16; intermediate tarsi with the 1st and 5th joints densely clothed with projecting black hairs; the 1st, 2nd, 3rd, and 4th also clothed with extremely long grey hairs; calcaria black; 7th ventral segment more rounded at the apex; 8th much wider, carinated down the centre; apical portion depressed, with a slight reflexed projection on its margin bearing a few hairs (for genitalia see Pl. X., figs. 8—8 b).

♀. Differs from that of *retusa* in having the pubescence longer, the face less transverse, the mandibles with the apical tooth long and sharp, and the calcaria of the posterior legs black.

*Hab.* Common in most places in the early spring.

3. *Anthophora furcata*, Panz. (Pl. XI., figs. 2—2 b).

Panz., Faun. Germ., 56, 8; Smith, Cat. Brit. Hym., 2nd ed., p. 193.

Black, clothed with brownish hairs; mesothorax with a band of darker hairs across the middle; ♂ with the clypeus white; legs simple. Abdomen without bands of paler hairs; 7th segment bidentate; ♀ with the 5th and 6th segments densely clothed with golden red hairs.

♂. Head closely punctured, clothed on the vertex with black and on the face with pale hairs; labrum and clypeus yellowish white, the apical margin of the latter pitchy black; scape of the antennæ in front with a white line. Thorax finely punctured, clothed with brown hairs, with a broad but rather ill-defined band of black hairs between the wings; wings slightly smoky in colour, the nervures dark brown. Abdomen shining, finely punctured, the first three segments clothed with pale brown hairs, the remainder with black; 7th segment bidentate; beneath with the 4th and 5th

segments clothed with brown velvety pubescence; 7th segment with two apical projections; 8th truncate, with a slight central emargination (for genitalia, &c., see Pl. XI., figs. 2—2*b*). Legs simple, clothed with brown hairs.

♀. Like the ♂ in general colour and shape, but with the labrum and clypeus black, the 4th segment of the abdomen only clothed with black hairs, the 5th and 6th with bright golden hairs; dorsal valve of the 6th segment very narrow and pointed, with the centre carinated and the sides reflexed; beneath with the apical margins of the segments piceous, and clothed with golden hairs. Length, 11—12 mm.

*Hab.* Not very common. London District, Norwich, Southwold, Deal, Littlehampton, Hastings, Chobham, Devonshire, &c.; July and August.

4. *Anthophora quadrimaculata*, Panz. (Pl. XI., figs. 3—3*b*).

Panz., *Faun. Germ.*, 55, 7; Smith, *Cat. Brit. Hym.*, 2nd ed., p. 192.

Black, clothed with pale hairs; ♂ with two large black spots at the base of the clypeus. Abdomen in both sexes with distinct continuous pale bands of hairs at the apex of the segments. Legs simple in both sexes, but the intermediate and posterior femora of the ♂ thickened.

♂. Shining black, clothed with ochreous-brown hairs, mixed with black on the thorax. Head punctured; clypeus, labrum, sides of the face, a spot near the base of each mandible, and a transverse line across the top of the clypeus, white; a large spot on each side of the clypeus at the base, and a small one on each side of the base of the labrum, also the apical margins of both clypeus and labrum, black; face clothed below the antennæ with silvery hairs, scape with a white line in front. Thorax rather remotely punctured on the disk, closely on the sides; wings scarcely clouded; scutellum shining, impunctate at the base. Abdomen shining; basal segment clothed with pale hairs, the others with black, each segment having an apical band of pale hairs; 7th largely punctured, bidentate at the apex; beneath clothed with pale hairs, finely punctured; 6th segment somewhat membranous at the apex, and with a central apical slit (for 7th and 8th segments and genitalia see Pl. XI., figs. 3—3*b*). Legs clothed with pale hairs; intermediate femora much dilated; posterior femora slightly so.

♀. Differs from the ♂ in being less shining and clothed with brighter pubescence; face entirely black; apical fringe of the 5th abdominal segment black; dorsal valve of the 6th segment narrow



and grooved round the margin; beneath with the head and thorax clothed with white hairs, abdomen with dull ochreous-grey hairs. Legs clothed with white hairs on their outer margins. Length, 10—12 mm.

*Hab.* Of this species F. Smith says:—"Appears about the end of June, and constructs its nest in banks, sandy cliffs, &c.; it frequents the dead-nettle (*Lamium purpureum*), and is not uncommon in the vicinity of London." I have never taken it myself, but have received it from Mr. Vincent R. Perkins from Gloucestershire; and Mr. Parfitt records it from Exmouth, Devon.

#### SAROPODA, Latr.

Latr., Gen. Crust. et Ins., iv., p. 177.

Differs from *Anthophora* in having only four joints to the maxillary palpi.

#### 1. *Saropoda bimaculata*, Panz. (Pl. XI., figs. 1—1 b).

Panz., Faun. Germ., 55, 17; Smith, Cat. Brit. Hym., 2nd ed., p. 186.

Short and broad; head and thorax clothed with bright brown hairs in the ♂, sooty brown in the ♀; face of the ♂ white; labrum, apex of clypeus, and a central line, white in the ♀. Abdomen with continuous pale bands.

♂. Head clothed with bright pale brown hairs; vertex black, mandibles, except the piceous apices, labrum, clypeus, and face below the antennæ, white; scape of antennæ white in front, the rest black. Thorax black, densely clothed with rather darker hairs than the head; wings almost clear. Abdomen short and sub-rotundate, black; basal segment clothed with long pale hairs, the others with shorter erect black ones, the apex of each with a narrow band of adpressed pale hairs; 7th segment with a central carina, branching at the apex, and forming two teeth; segments beneath fringed with long hairs at the apex, 7th and 8th truncate at the apex (for which and genitalia see Pl. XI., figs. 1—1 b). Legs clothed with brown hairs; posterior femora and tibiæ slightly thickened; posterior metatarsi as long as the tibiæ; calcaria pale.

♀. Like the ♂ in shape, but duller in the colour of the pubescence; mandibles, labrum, apex of the clypeus, and a line down the middle of the base, white; antennæ entirely black. Disk of the thorax with sooty brown hairs, those round the margins brighter and paler. Abdomen as in the ♂; 5th and 6th segments

with dense fringes of black-brown hairs; apical dorsal valves very narrow and pointed; segments beneath with fringes of dull golden hairs. Legs clothed on their outer sides with pale, somewhat silvery, hairs. Length, 9—10 mm.

*Hab.* Common in many localities in July and August, and may generally be traced by the high pitched note of its flight. Frequents labiate plants.

#### CERATINA, Latr.

Latr., Hist. Nat. Ins., xiv., p. 50.

Wings with three submarginal cells; labial palpi 4-jointed; maxillary palpi 6-jointed; ♂ with six ventral segments of the abdomen exposed; anal opening inferior; genital armature rather stout; base of the sagittæ covered with a membrane; ♀ without apparent pollen-brush.

Of this small genus of glabrous, blue, or metallic-coloured bees we have only one species in England whose capture has been really well authenticated. It is closely allied to the large *Xylocopa*, so well known on the Continent; and therefore, although in our limited list it seems to be somewhat out of place near *Psithyrus*, that is where it comes naturally in the more extensive fauna. I think it is doubtful if *Xylocopa* should not itself be moved nearer the commencement of the *Apidæ*, but I have thought better to adopt the position usually assigned to it by continental writers.

#### 1. *Ceratina cyanea*, Kirb. (Pl. XI., figs. 5—5 a).

Kirb., Mon. Ap. Angl., ii., p. 308, pl. 17, 7 and 8; Smith, Cat. Brit. Hym., 2nd ed., p. 180.

Small, blue, shining, almost glabrous, punctured; ♂ with the clypeus and labrum white; apical segment of the abdomen carinated in the ♀.

♂. Head blue, closely punctured; antennæ black or pitchy, clypeus and labrum white. Thorax shining, of a less bright blue than the head, more remotely punctured; wings with a brownish tinge; metathorax finely rugose at the base. Abdomen closely punctured; 6th segment carinated down the middle at the apex; 7th segment inflected, its apex bidentate; ventral segments one to six visible; 6th and 7th apparently soldered together, the apex bidentate; 8th nearly entirely membranous, with a narrow apical chitinous band (for genitalia see Pl. XI., figs. 5—5 a). Legs pitchy black; the extreme base of the tibiæ with a white spot.

♀. Very like the ♂, but with the face unspotted, and the apex of the abdomen simply pointed, not inflexed; the 6th segment above rugose and slightly carinated. Length, 6—7 mm.

*Hab.* Folkestone; Charlton; Birch and Darenth Woods; Weybridge; S. Devon. Hybernates in dead bramble-stems (*F. Smith*).

### PSITHYRUS, *Lep.*

*Lep.*, Ann. Soc. Ent. Fr., ii. (1832) = *Apathus*, Newman.

Wings with three submarginal cells; labial palpi 4-jointed, maxillary palpi 2-jointed; ♂ with the mandibles not fringed with curled hairs, as in the genus *Bombus*, and with the posterior tibiæ outwardly convex, dull, and hairy; ♀ without any corbicula to the posterior tibiæ, which are outwardly convex, dull, and hairy, like those of the ♂; basal joint of posterior tarsi simple.

A genus of parasitic bees living in the nests of species of *Bombus*, and often resembling them so closely in colour, &c., as to be distinguishable only by the generic characters given above.

- (2) 1. 4th and following segments of the abdomen red in both sexes .. .. . *rupestris*.
- (1) 2. 4th and following segments of the abdomen either white or yellow, or of various colours, but not all red.
- (4) 3. ♂ with the abdomen subglobose, the extreme apex fulvous; ♀ with the extreme apex of the abdomen beneath armed with a pointed process .. *quadricolor*.
- (3) 4. ♂ with the abdomen subtriangular, its extreme apex black; ♀ with the apex simple.
- (6) 5. Both sexes with the posterior metatarsi almost as wide as the tibiæ, and generally with a line of yellow pubescence dividing the black of the base of the abdomen from the white of the apex; ♂ with the sagittæ of the genital armature not toothed beneath .. .. . *vestalis*.
- (5) 6. Posterior metatarsi much narrower than the tibiæ, no yellow line of pubescence between the black and white; ♂ sagittæ dentate beneath.
- (8) 7. Apical segments of ♂ black or yellow, not white; 6th segment beneath simple, squamæ of the genital armature widely triangular; ♀ with the apex of the abdomen yellow at the sides, 6th segment shining at the base .. .. . *campestris*.
- (7) 8. Apical segments of ♂ white, 6th segment beneath with a distinct callosity on each side, squamæ of genital armature narrowly triangular; ♀ with the apex white, the 6th segment rugosely punctured .. .. . *Barbutellus*.

1. *Psithyrus rupestris*, Fab. (Pl. XI., fig. 8).

Fab., Ent. Syst., ii., p. 320; Smith, Cat. Brit. Hym., 2nd ed., p. 221.

Black, clothed with black hairs; hairs of the three apical segments in the ♀ and of the four in the ♂ red. Thorax and basal segments of the abdomen often more or less grey in the ♀; wings dark brown, with blue reflections in the ♀.

♂. Head clothed with black hairs; cheeks between the eyes and mandibles about as long as wide; mandibles bifid at the apex; antennæ with the 2nd and 4th joints of the flagellum subequal, the 3rd a little more than half the length of the 4th; 4th and 5th subequal. Thorax punctured, clothed with long black hairs, often with a band in front, and the sides below the wings and the metathorax posteriorly more or less grey; wings brownish. Abdomen clothed with black hairs on the 1st, 2nd, and 3rd segments, and with red on the rest; the hairs of the apical margins of the basal segments and their sides often grey; beneath punctured, genital armature with the sagittæ hamately toothed beneath; the squama with a long process on its inner margin; lacinia very long, and angularly produced inwards at the base, fringed with long hairs, as also the stipites on their inner margins (see Pl. XI., fig. 8); tibiæ and tarsi clothed with reddish hairs.

♀. Larger than the ♂, deep black; wings dark brown with bluish reflections; apical segments bright red. Legs clothed with black hairs; apex of the metatarsi and the apical joint of the tarsi clothed with short reddish hairs. Length, 16—22 mm.

*Hab.* Common in many localities, and widely distributed, living with *Bombus lapidarius*.

2. *Psithyrus vestalis*, Fourcr. (Pl. XI., fig. 7).

Fourcr., Ent. Par., ii., p. 450; Smith, Cat. Brit. Hym., 2nd ed., p. 221.

Black; thorax with a broad yellow band in front; both sexes with the apex of the abdomen white from the 4th segment, and with some yellow hairs on the 3rd, separating the black base from the white apex; posterior metatarsi almost as wide as the tibiæ; sagittæ of ♂ genital armature not toothed beneath.

♂. Head densely clothed with black hairs; antennæ with the 3rd joint of the flagellum rather shorter than the 2nd; 4th about as long as the 2nd and 3rd together; 5th slightly shorter than the 4th. Thorax densely clothed with black hairs, and with a broad bright yellow band in front; wings smoky brown. Abdomen

punctured; posterior margins of the segments smooth; 1st and 2nd segments clothed with black hairs; 1st often with yellow hairs intermixed or entirely yellow; 3rd with black hairs at the base and yellow hairs at the apex; 4th and 5th with white; 6th with white intermixed with black; 7th with black; beneath shining, largely punctured; genital armature with the lacinia short, triangular; the sagittæ not toothed beneath (see Pl. XI., fig. 7). Legs clothed with black hairs; apical joints of the tarsi piceous, with reddish hairs; posterior tibiæ rounded and punctured; posterior metatarsi long and as wide as the tibiæ.

♀. Larger and stouter than the ♂, but similarly coloured; pubescence of the 3rd segment of the abdomen widely yellow at the apex; 6th segment above shining, narrowly grooved towards the apex, sides and apex clothed with short velvety brown pubescence; beneath shining, largely punctured, clothed with black hairs; 6th segment with a longitudinal elevation on each side close to the apex; apex simple, clothed with brown velvety hairs; posterior metatarsi wide, as wide nearly as the tibiæ. Legs clothed with black hairs outwardly; posterior tibiæ and all the tarsi with brown hairs on the side towards the body. Length, 18—22 mm.

*Hab.* Common and generally distributed. Lives with *Bombus terrestris*.

### 3. *Psithyrus Barbutellus*, Kirb. (Pl. XI., figs. 6—6 b).

Kirb., Mon. Ap. Angl., ii., p. 343 (nec Smith).

Black, clothed with black hairs; both sexes with some of the hairs on the vertex of the head, a band across the front of the thorax, and a band behind the scutellum, yellow; ♂ with the 3rd joint of the flagellum much shorter than the 2nd; 4th and 5th subequal, 4th longer than the 2nd by about one-fourth of its length in both sexes. Abdomen with the basal segment more or less clothed with yellow hairs intermixed with the black, sometimes entirely yellow, rarely entirely black; 4th, 5th, and 6th segments with white hairs; no yellow hairs at the apex of the 3rd; 7th in the ♂ with black hairs; 6th in the ♀ rugosely punctured, with a raised dorsal line; 6th segment beneath in the ♂ with two slightly raised tubercles at the apex; 6th in the ♀ with its edges reflexed at the apex and somewhat thickened; posterior metatarsi distinctly narrower than the tibiæ; genital armature of the ♂ with the sagittæ beneath armed with a large triangular tooth (see Pl. XI., figs. 6—6 b). Length, 17—20 mm.

♂. Differs from that of *vestalis* in having the vertex clothed more or less with yellow hairs, in having a yellow band on the

thorax posteriorly, no yellow on the 3rd segment of the abdomen, and in having the 6th segment beneath raised into a small oval tubercle on each side at the apex, and in having the sagittæ of the armature toothed beneath.

♀. Differs from *vestalis* in being smaller, with the vertex and a band round the thorax posteriorly more or less yellow, in having the basal segment of the abdomen more or less clothed with pale hairs, the 3rd without any yellow at the apex; apical segment beneath more widely rounded, more shining, the edges more widely reflexed, and without any velvety pubescence within them; posterior metatarsi decidedly narrower than the tibiæ.

*Hab.* Chobham, Norfolk, &c.; probably widely distributed, but mixed with *campestris* in most collections.

#### 4. *Psithyrus campestris*, Panz. (Pl. XII., fig. 1).

Panz., Faun. Germ., 74, 11; Smith, Cat. Brit. Hym., 2nd ed., p. 223.

A very variable species, especially in the ♂, which is sometimes entirely clothed with black hairs, sometimes almost entirely with yellowish hairs; but, as far as I know, the apical segments are never white. Perhaps the most ordinary variety is that with the basal segment of the abdomen clothed with yellowish hairs, the 2nd and the centre of the 3rd at its base with black, and the apical segments with yellow. The ♀ has a broad band across the front and posterior portion of the thorax yellow; abdomen with an apical fringe to the basal segment, and the sides of the apical segments, yellow. The following structural characters will serve to distinguish this species from its allies in all its varieties:—

♂. 3rd joint of the flagellum of the antennæ slightly shorter than the 2nd; 4th about two-thirds as long as the 2nd and 3rd together; 6th ventral segment simple, slightly channelled down the middle, without apical elevations, each side bearing a long tuft of black hairs; genital armature with the sagittæ largely dentate beneath, the lacinia very broad and triangular, their inner margins straight, meeting each other in parallel lines (see Pl. XII., fig. 1).

♀. Dorsal valve of 6th segment narrowly pointed at the apex; ventral valve narrow and widely reflexed, and thickened at the sides, causing a rather long apical sulcature between the elevations. Length, 17—20 mm.

*Hab.* Common and generally distributed. Lives with *Bombus hortorum* and vars.

5. *Psithyrus quadricolor*, Lep. (Pl. XII., fig. 2).

Lep., Ann. Soc. Ent. Fr., i., p. 376 = *Barbutellus*, ♂, Smith (nec Kirby), Cat. Brit. Hym., 2nd ed., p. 222.

Black; thorax with a wide yellow band in front, and some pale hairs posteriorly round the scutellum; apex of the abdomen in the ♀ clothed with white hairs, extreme apex of the ♂ with reddish hairs.

Very like the three preceding, but differing in the following particulars:—

♂. 2nd and 4th joints of the flagellum of the antennæ subequal; 3rd about two-thirds as long as the 4th. Abdomen shorter; 5th segment clothed with black hairs, 6th and 7th with rufescent hairs; 7th segment beneath simple; genital armature very different from that of any other species, the lacinia produced into a long, narrow, horny process (see Pl. XII., fig. 2).

♀. Differs from any of the preceding in being smaller, with the abdomen (looked at from above) more rounded; the 7th dorsal segment shining, finely and irregularly punctured; 6th ventral segment armed at the extreme apex with a reflexed triangular spine or tooth, which projects amongst the dense pubescence which clothes the apex of the segment. Length, 15—20 mm.

*Hab.* Common in many localities, and generally distributed. Lives with *Bombus pratorum* and *Schrimshiranus*.

## BOMBUS, Latr.

Latr., Hist. Nat. Ins., xiv., p. 63.

Wings with three submarginal cells; labial palpi 4-jointed; maxillary palpi 2-jointed; mandibles of ♂ fringed with curled hairs; posterior tibiæ outwardly shining, generally with a more or less distinct impression down the centre; ♀ with the posterior tibiæ dilated and concave outwardly, very shining, with a fringe of long hairs on each side of the concavity (this arrangement is called the "corbicula"); ♂ with six ventral segments exposed; 7th subtransparent, shaped much as the 6th; 8th narrower, somewhat truncate, hairy at the apex; genital armature stout, very variable in form (see Pl. XII.).

A genus of social bees. Communities consisting of males, females, and workers.

- (6) 1. Thorax clothed with yellow or brownish hairs, unbanded.
- (3) 2. Under side of thorax and abdomen clothed with black hairs .. .. . *Smithianus*.
- (2) 3. Under side of thorax and abdomen clothed with pale hairs.
- (5) 4. ♂, joints of antennæ very slightly rounded beneath, sagittæ of the genital armature hamate at the apex; ♀ and ♂, abdomen without black hairs, tibiæ with pale hairs.. *cognatus*.
- (4) 5. ♂, joints of antennæ much rounded beneath, sagittæ of armature not hamate; ♀ and ♂, abdomen with black hairs intermixed with the yellow, tibiæ with black hairs .. .. *muscorum*.
- (1) 6. Thorax banded with black, or entirely black.
- (18) 7. Abdomen clothed with white or tawny or black hairs at the apex, not red.
- (9) 8. ♂, sagittæ of the genital armature denticulate beneath; ♀ and ♂ with the tongue very long, often longer than the entire insect .. .. *hortorum*.
- (8) 9. ♂, sagittæ not denticulate; ♀ and ♂ with the tongue not so long, seldom extending beyond the metathorax.
- (11) 10. Abdomen entirely tawny yellow .. .. *distinguendus*.
- (10) 11. Abdomen with black markings.
- (13) 12. Face very long, cheeks nearly half as long as the eyes; extreme apex of the abdomen in the ♂ clothed with black hairs; ♀ and ♂, abdomen black at the base, 2nd segment not flavous or tawny .. .. . *Latreillellus*.
- (12) 13. Face not very long, cheeks not nearly half the length of the eyes; apex of the abdomen in the ♂ white; ♀ and ♂ with the basal or 2nd segment yellow or tawny.
- (17) 14. ♂, metatarsi clothed with long hairs along the upper margin; ♀ and ♂ with yellow hairs on the basal segment, at least at the apex laterally.
- (16) 15. ♂, face with yellow hairs; ♀ and ♂, basal segment only of abdomen with yellow hairs *Schrimshiranus*.
- (15) 16. ♂, face black; ♀ and ♂, 2nd segment of abdomen yellow .. .. . *soroensis*.
- (14) 17. ♂, metatarsi clothed with very short hairs along the upper margin; ♀ and ♂, 2nd segment only yellow or tawny .. .. *terrestris*.
- (7) 18. Abdomen with the terminal segments clothed with red hairs.
- (24) 19. ♂, posterior metatarsi clothed with very short hairs along the upper margin; ♀ and ♂, intermediate metatarsi produced at the external apical angle into an angular spine.
- (21) 20. ♂, face clothed with pale hairs; ♀ and ♂, abdomen with the first two segments clothed with pale hairs, the 3rd and 4th with black, and the apex with red .. .. . *sylvarum*.



- (20) 21. ♂, face clothed with black hairs; ♀ and ♂, abdomen clothed with black at the base and red at the apex, or with pale, but in the latter case with no black on the 3rd and 4th segments.
- (23) 22. Red on the apical segments in sharp contrast with the black of the preceding; ♀ and ♂ with the hairs of posterior tibiæ red .. *Derhamellus*.
- (22) 23. Black of the base of the abdomen gradually shading into the red of the apex; or the abdomen entirely greyish with the apex red, and without a black central band .. .. *ponorum*.
- (19) 24. ♂, posterior metatarsi outwardly fringed with long hairs; ♀ and ♂, intermediate metatarsi not produced at the external apical angle.
- (26) 25. Abdomen with the 3rd and following segments red in all the sexes .. .. *lapponicus*.
- (25) 26. Abdomen never with more than the 4th and following segments red.
- (28) 27. Basal segments of the abdomen entirely black in the ♂; thorax entirely black in ♀ and ♂ *lapidarius*.
- (27) 28. Basal segments of the abdomen not black in the ♂; thorax with a pale band in front in the ♀ and ♂.
- (30) 29. ♂, genital armature with the sagittæ curved outwards at the apex, posterior metatarsi much narrowed at the base; ♀ and ♂, face wider across the eyes than long, somewhat square, very little narrowed to the apex .. *soroensis*, var.
- (29) 30. ♂, genital armature with the sagittæ curved at the apex inwardly, and forming a semi-circular hook; ♀ and ♂, face narrow, longer than wide across the eyes, considerably narrowed to the apex .. .. *pratorum*.

### 1. *Bombus Smithianus*, White. (Pl. XII., fig. 3).

White, Proc. Linn. Soc. (1851); Smith, Cat. Brit. Hym., 2nd ed., p. 202.

Head clothed with black hairs; thorax above with bright, rather dark, fulvous hairs, abdomen with paler; beneath entirely clothed with black hairs, except the apical segments of the abdomen.

♂. Head clothed with black hairs; face with a little pale pubescence below the antennæ; cheeks shining, about as long as their apex is wide; labrum impressed across the middle, clothed with black hairs; antennæ with the joints slightly rounded in front; 3rd joint of the flagellum considerably shorter than the 2nd. Thorax clothed with bright fulvous hairs of a richer darker colour than those of any of our other species; wings smoky brown. Abdomen with paler, yellower hairs, its base rather darker, and 7th

segment with black hairs; beneath entirely clothed with black hairs, except the apical segments of the abdomen, which are clothed with pale ochreous; genital armature with the sagittæ curved downwards, and slightly hamate at the apex, angulated beneath behind the middle; squama large, produced inwards at the apex of the stipes, and forming a flat somewhat triangular process, sharply pointed at its apical angle; the rest of the squama somewhat quadrangular; lacinia projecting slightly beyond the squama, sinuate at the apex, and densely clothed with brown hairs (see Pl. XII., fig. 3). Legs clothed with black hairs.

♀ and ♂. Coloured like the ♂, and easily distinguished from any of the other species of this section by the dense black hairs of the face and under side, and by the rather longer less pointed abdomen. Length, 15—20 mm.

*Hab.* This beautiful species has at present only been found in the extreme north, and is recorded from Shetland and the Hebrides.

2. *Bombus cognatus*, Steph. (Pl. XII., figs. 4—4 a).

Steph., Brit. Ent., Suppl., vii., 17, pl. 43, f. 3 = *venus-tus*, Smith, Cat. Brit. Hym., 2nd ed., p. 201 = *senilis*, do., 1st ed. = *variabilis*, Schmied.

Entirely clothed with tawny yellow hairs, varying to dark brown, those on the thorax and 2nd segment of the abdomen brighter and darker; ♂ with the joints of the antennæ only very slightly rounded on their anterior margins; genital armature with the sagittæ hamate at the apex; legs of both sexes with pale hairs.

♂. Head subelongate, clothed with pale ochreous hairs; cheeks shining, vaguely punctured, about as long as their apex is wide. Antennæ with the 3rd joint of the flagellum almost equal to the 2nd, the remaining joints slightly curved on their anterior margins and sinuate on their posterior margins. Thorax clothed with bright orange-yellow hairs, paler below the wings; wings slightly tinged with brown. Abdomen clothed with pale ochreous hairs; the 2nd, 3rd, and 4th segments with a wide band of orange-coloured hairs at the base; 7th segment clothed with black hairs; genital armature with the sagittæ hamate at the apex; the squama with its inner margin reflexed, sinuate, produced at both base and apex, especially at the base, where the process forms a cartilaginous plate, perpendicular to the dorsal surface of the armature; in the sinus is a small sharp tooth or spine; lacinia rather long, projecting considerably beyond the squama, sharply falcate (see Pl., XII., figs. 4—4 a). Legs clothed with pale hairs, mixed with black on the tibiæ and also on the anterior femora.

♀ and ♂. Like the ♂ in colour, though generally darker; the abdomen without black hairs; the 2nd, 3rd, and 4th segments with a basal band of brighter and darker brown hairs; corbicula of posterior legs with pale hairs; beneath clothed with pale hairs. Length, 10—18 mm.

*Hab.* Not uncommon in many places, and generally distributed.

This species, called by Dr. Schmiedeknecht *variabilis*, is the true *cognatus*, Stephens, of which I have had the opportunity of examining the type in the British Museum. In this country I do not think it varies to the extent that it does on the Continent. Some old specimens, long exposed to the weather, are nearly grey, and some dark varieties of the ♀ and ♂ are brown, not yellow; but I have never seen anything like the very dark varieties mentioned by Schmiedeknecht. It is at once known from *Smithianus* by the pale under side, &c.; from *muscorum* by the characters given in the note to that species.

### 3. *Bombus muscorum*, Linn. (Pl. XII., fig. 7).

Linn., Syst. Nat., ed. x., i., p. 579; Smith, Cat. Brit. Hym., 2nd ed., p. 199 = *agrorum*, Schmied., &c.

Thorax clothed with tawny yellow hairs; abdomen with yellow hairs, more or less mixed with black, sometimes almost entirely black; legs clothed with black hairs; under side with pale ochreous; antennæ of the ♂ with each joint of the flagellum produced and rounded on its anterior margin.

♂. Head clothed with black hairs, intermixed in some varieties with paler ones, especially on the face; cheeks shining, rather longer than their apex is wide. Antennæ with the 3rd joint of the flagellum considerably shorter than the 2nd, its 4th and following joints produced and rounded on their anterior margin. Thorax densely clothed with tawny yellow hairs, in some varieties with a few black hairs intermixed. Abdomen clothed with tawny or ochreous hairs, more or less intermixed with black (in some varieties the black appears only on the sides of the 1st and 2nd segments, in others the black hairs extend nearly all over the segments, leaving only a paler ochreous fringe at the apex of each); beneath clothed with greyish hairs; genital armature with the squama deeply emarginate on its inner margin, and with an apical somewhat rounded production beyond the emargination; at the base of the squama is a short spine projecting forwards; lacinia

densely clothed with hairs beneath, only just showing above the squama as a short falcate tooth; a second sharp tooth of the lacinia may be seen just underneath the anterior process of the squama (see Pl. XII., fig. 7). Legs clothed with black hairs, sometimes intermixed with pale.

♀ and ♂. Very like the ♂ in colour, varying from bright orange-yellow, with only a few black hairs on the sides of the 1st and 2nd segments and legs, to almost black, with the exception of the disk of the thorax and the under side; in structure the ♀ and ♂ approach so closely to *cognatus* as to be scarcely recognisable; the cheeks between the eyes and mandibles are slightly shorter and broader at the apex; the apex of the abdomen beneath has a more distinct carina. In colour all the sexes may be known from *cognatus* by the black hairs on the abdomen and posterior legs, and the less regular style of the pubescence itself, which is in this species longer and more ragged. Length, 10—18 mm.

*Hab.* Generally distributed and very common. The ♂ varies extremely in size.

#### 4. *Bombus distinguendus*, Mor.

Mor., Hor. Soc. Ent. Ross., vi., p. 32 = *elegans*, Smith (nec Seidl.), Cat. Brit. Hym., 2nd ed., p. 202 = *fragrans*, Auct. (nec Pallas).

Head, thorax, and abdomen clothed with yellow hairs, a transverse band across the thorax between the wings black; legs clothed with black hairs.

♂. Face clothed with yellow hairs, intermixed with black on the sides and vertex; cheeks long and shining; beard of the mandibles black. Antennæ with the 2nd joint of the flagellum considerably longer than the 3rd, and considerably shorter than the 4th; 3rd about half as long as the 4th; the rest of the joints slender, scarcely bent, their sides subparallel. Thorax clothed with yellow hairs, with a well-marked band of black hairs between the wings; wings slightly dusky. Abdomen clothed with yellow hairs, the hairs at the base of each segment slightly darker and brighter than those at the apex; beneath punctured; 8th segment narrow, parallel-sided, densely hairy at the apex, which is rounded; genital armature with the sagittæ wide at the base, then narrow, with an inferior process just beyond the constriction, the apex widened out triangularly; stipites longitudinally carinated; squamæ transverse, produced at their interno-anterior angles into a sharp point; lacinia produced on their inner margin into a narrow blunt tooth (see Pl. XII., figs. 12—12 b). Legs clothed with black hairs.

♀ and ♂. Like the ♂ in colour, and differing only in the ordinary sexual characters; apex of the abdomen beneath with a long central keel extending to about the half of the segment. Length, 15—20 mm.

*Hab.* Hampstead, Shirley, Norwood, Norwich, Lowestoft, Yarmouth, Yorkshire, Scotland; rare in the South of England.

5. *Bombus Latreillellus*, Kirb. (Pl. XII., figs. 12—12 b).

Kirb., Mon. Ap. Angl., ii., p. 330; Smith, Cat. Brit. Hym., 2nd ed., p. 216 = *subterraneus*, Thoms.

Head clothed with black hairs in both sexes, more or less mixed with yellowish on the face in the ♂; tongue scarcely reaching beyond the anterior coxæ. Thorax clothed with yellowish hairs in the ♂, with a broad black band between the wings; with black in the ♀ and ♂, with a narrow yellow band in front and a few yellow hairs on the metathorax. Abdomen black at the base; the 4th and following segments dirty white or yellowish; the apical margins of the basal segments fringed with the same colour.

♂. Differs from the preceding, besides in the colour characters given above, in having the 2nd and 4th joints of the flagellum subequal, the 8th ventral segment of the abdomen emarginate at the apex, and the genital armature with the inferior process of the sagittæ sharply pointed above in front (see Pl. XII., figs. 12—12 b).

♀ and ♂. Differ from *distinguendus*, so far as I have been able to make out, only in colour. Length, 16—20 mm.

*Hab.* Generally distributed in the South of England, and abundant in some localities.

I have little doubt that Morawitz is right in considering this as a variety of the preceding; the structural characters are so slight as to be scarcely worth considering apart from the colour; and in the ♂ we find varieties which run almost as pale as the typical *distinguendus*. *Subterraneus*, *hortorum*, and *ligusticus* are now considered as forms of one species, the ♀ of each being distinguishable in colour, but the ♂ identical; and I think this species and the last should be united on the same principle.

The ♀ and ♂ resemble *hortorum* and *subterraneus* in colour, but the shorter face and the short tongue will separate them at once from that species.

6. *Bombus hortorum*, Linn. (Pl. XII., fig. 6).

Linn., Faun. Suec., ed. alt., p. 424; Smith, Cat. Brit. Hym., 2nd ed., p. 214.

Var. = *subterraneus*, Auct. (nec Thoms.).

Var. = *Harrisellus*. Kirb.

Head black; cheeks very long, two-thirds as long as the eyes. Thorax black, widely yellow anteriorly and posteriorly; abdomen with the basal segment yellow, the 2nd and 3rd black, the remainder white, or the whole insect entirely black (*Harrisellus*); colour varying to almost any extent between the two extremes; tongue very long, almost as long as the body in the ♀ and ♂; sagittæ in the ♂ denticulate exteriorly.

♂. Head clothed with black hairs; face very long and parallel-sided; cheeks shining, very long, more than twice the length of their apex. Antennæ with the 2nd and 4th joints of the flagellum subequal, the 3rd very short; tongue reaching to the posterior coxæ. Thorax clothed with black hairs, with a wide yellow band in front, and another across the metathorax; wings more or less brownish. Abdomen with the basal segment yellow-haired; the 2nd and 3rd black; the 4th, 5th, and 6th white, and the apical segment black; beneath clothed with white hairs, 6th segment with black; 7th with a few bristly black hairs; 8th somewhat rounded at the apex, with a very small central emargination; genital armature with the sagittæ finely and sharply serrate beneath; squama wide in front, narrowed behind, and produced along the stipes towards its base, then turned back and armed with a recurved spine at its apex (see Pl. XII., fig. 6). Legs clothed with black or reddish black hairs; posterior tibiæ shining.

Var. *Harrisellus*.—Entire insect clothed with black hairs.

♂ and ♀. Like the ♂ in colour, but more subject to variation; in the ♂ intermediate varieties between the typical form and the black one are rare, in the ♂ and ♀ they are common; head shaped as in the ♂; tongue very long, often as long as the body; cheeks two-thirds as long as the eye; posterior tibiæ with black hairs. Length. and ♀ 16—22 mm., ♂ 12—15 mm.

*Hab.* Very common, and generally distributed.

This species has usually been considered as constituting two, but there is no satisfactory structural character to separate them apart, and the male armature in all the varieties is identical: to *subterraneus* have been referred the large females of a less bright coloration, with the abdomen rather broader at the apex, and with its

pubescence slightly shorter. The ♂ of *subterraneus* has been distinguished as having the beard of the mandibles red; but there is much variation amongst the males in this respect, and that therefore seems to be a useless character. The black variety, *Harrisellus*, is rarer than the typical form.

### 7. *Bombus nivalis*, Smith.

Smith, Cat. Brit. Hym., 2nd ed., p. 210 = *nivalis*, Dahlb. ? ?

“♀, 8—9 lines. The pubescence on the head black; that on the thorax above yellow, more or less inclining to fulvous, with a band of black pubescence between the wings; that on the sides, on the legs, and on the thorax beneath, black; wings subhyaline. Abdomen: the pubescence on the two basal segments yellow, on the 3rd it is black, and on the three apical segments of a fulvous-yellow.”

“♂, 6—7 lines. Only differs from the ♀ in having the pubescence at the apex of the abdomen paler, inclining to white.”

“♂, 6—6½ lines. The face before the antennæ clothed with yellow pubescence, with a black band between the wings; beneath and on the femora it is of a very pale yellow, on the tibiæ it is black. Abdomen: the two basal segments with yellow pubescence, the 3rd and 4th with black, and the apical ones with pale yellowish white; beneath the pubescence is also yellowish white.”

I have quoted Smith's description verbatim, because, after a careful examination of the specimens in the British Museum, I do not feel sure that they have been correctly referred to *nivalis*, Dahlb.; and yet they do not agree exactly with any other British species; they most closely resemble *Schrimshiranus* both in form and colour, but the ♀ has the hairs of the tibiæ black, and the ♂ has the posterior metatarsi less gradually constricted at the base, although clothed with long hairs as in that species. Unfortunately the genital armature is not exposed, so that the species cannot be determined for certain; but continental *nivalis* is such a much larger and more brightly coloured insect that I cannot imagine ours can be identical with it. The species was taken in Shetland in 1852. More specimens are wanted to decide if it be only a variety of *Schrimshiranus* or a distinct species.

8. *Bombus Schrimshiranus*, Kirb.

Kirb., Mon. Ap. Angl., ii., p. 342 = *Jonellus*, Smith, Cat. Brit. Hym., 2nd ed., p. 209.

In coloration almost similar to typical *hortorum*, but smaller, and easily recognised by the following characters:—

♂. Face clothed with yellow hairs; 3rd joint of the flagellum more than half the length of the 2nd; cheeks not one-third of the length of the eyes; genital armature with the sagittæ not serrate beneath, each terminating in a sickle-like hook; the squama and lacinia very short and simple (the figure of the armature of *pratorum* will serve equally for this species). Tibiæ and tarsi clothed with reddish hairs.

♀ and ♂. Smaller than in *hortorum*, the yellow colour less bright, the face much shorter, the cheeks not being one-third of the length of the eyes, the tongue not reaching beyond the basal segment of the abdomen, and the hairs on the posterior tibiæ red instead of black. Length, ♂ and ♀ 15—18 mm., ♂ 10—12 mm.

*Hab.* Rare. Coombe Wood; Purley Downs; Shirley Common; Chobham; Hayling Island; Bournemouth; Barmouth, N. Wales.

The ♀ of this species is one of our smallest Bombi.

9. *Bombus pratorum*, Linn. (Pl. XII., figs. 5—5 b).

Linn., Faun. Suec., ed. alt., p. 424; Smith, Cat. Brit. Hym., 2nd ed., p. 207.

Thorax clothed with black hairs, with a wide yellow band in front; face with yellow in the ♂. Abdomen: 1st segment clothed with black hairs at the base, generally with yellow at the apex; 2nd segment with bright yellow hairs; 3rd and 4th in both sexes, or sometimes 3rd only in the ♂, black; the remainder red; the yellow on the 2nd segment of the ♀ and ♂ sometimes nearly absent.

♂. Face clothed with yellow hairs, subelongate; cheeks converging considerably towards the mandibles, shining, about one-third as long as the eyes. Antennæ with the 2nd and 4th joints of the flagellum subequal, the 3rd two-thirds the length of the 4th. Thorax clothed with black hairs, with a wide sulphur-yellow band in front, entirely black posteriorly. Abdomen clothed with black hairs at the extreme base of the 1st segment, with bright yellow on the apex of the 1st and on the 2nd, with black on the 3rd and sometimes also on the 4th, and with red on the remainder; beneath



clothed with black hairs on the first three segments, and with red on the last three; genital armature in the ♂ shaped as in the preceding (see Pl. XII., figs. 5—5*b*). Legs clothed with pale hairs intermixed with black.

♀ and ♂. Differing from the ♂, besides in the usual sexual characters, in having the yellow colour of the hairs rather less bright, the black abdominal band wider, sometimes nearly covering the whole body. Length, ♂ and ♀ 15—18 mm., ♀ 10—12 mm.

*Hab.* Very common and generally distributed.

#### 10. *Bombus lapponicus*, Fabr.

Fabr., Ent. Syst., ii., p. 318; Smith, Cat. Brit. Hym., 2nd ed., p. 204.

Head and thorax clothed with black hairs; the face below the antennæ in the ♂, the thorax widely in front and very narrowly behind, in both sexes, yellow. Abdomen black at the extreme base in the ♀, on the first three segments in the ♂; the rest of the abdomen in both sexes clothed with red hairs.

♂. Clothed with rather shaggy hairs. Head clothed with pale hairs on the vertex, and with yellow on the face below the antennæ; face shorter and wider than in *pratorem*, the distance between the eyes on the vertex being more nearly the length of the eye; cheeks rugosely punctured, shining, as short as their apical width. Antennæ with the 2nd and 4th joints of the flagellum subequal, the 3rd about two-thirds the length of the 2nd. Thorax clothed with black hairs, with a wide yellowish band in front, and a very narrow one round the metathorax posteriorly; wings slightly dusky. Abdomen clothed on the first two segments with black hairs, and on the 3rd and following segments with red, the hairs of the basal segments sometimes intermixed with yellow; beneath entirely clothed with ochreous-yellow hairs.

♀ and ♂. Coloured much as the ♂, but the colours brighter, and the abdomen black only on the 1st segment and the extreme base of the 2nd, the remainder red or orange-red. Abdomen beneath clothed with fine black hairs; hairs of the tibiæ black. Length, ♂ and ♀ 15—17 mm., ♀ 12—14 mm.

*Hab.* Mountainous districts; Black Mountain, Brecknockshire; Snowdon; Herefordshire; Monmouthshire; Halifax Moor, Yorkshire; Loch Rannoch, Perthshire.

11. *Bombus sylvarum*, Linn. (Pl. XII., fig. 11).

Linn., Faun. Suec., ed. alt., p. 425; Smith, Cat. Brit. Hym., 2nd ed., p. 203.

Black, clothed with greyish hairs, an indefinite band across the thorax between the wings, and a very narrow band at the base of the 3rd segment of the abdomen, clothed with black, the 4th and following segments with red or yellowish red.

♂. Head clothed with greyish hairs, intermixed with black on the vertex and at the sides; cheeks shining, remotely punctured, about as long as their apical margin; mandibles piceous at the apex. Antennæ with the 4th joint of the flagellum equal to the 2nd and 3rd taken together, the 2nd slightly longer than the 3rd, the remaining joints subarcuate. Thorax clothed with grey hairs, with a wide indefinite band of black hairs across the centre; wings slightly dusky. Abdomen clothed with greyish hairs at the base, the 2nd segment with ochreous hairs at the base and with grey at the apex, the 3rd with black hairs at the base and grey at the apex, and the following segments with yellowish red hairs; each with a narrow apical band of grey hairs; beneath entirely clothed with grey; genital armature with the sagittæ curved at the base, the apex hamate beneath; squama produced at the base inwardly into a long curved spine; lacinia triangularly produced beyond the squama, obliquely truncate on its inner margin, which is armed with a small square tooth, and produced slightly at both angles (see Pl. XII., fig. 11). Legs clothed with grey hairs; tarsi piceous at the apex, clothed with ferruginous hairs.

♀ and ♂. Like the ♂ in colour, but differing in the usual sexual characters, and also in having the 2nd segment of the abdomen often with black hairs intermixed with the grey. Length, ♂ and ♀ 14—16 mm., 12—14 mm.

*Hab.* Generally distributed.

The coloration of this species, which varies very little, will distinguish it from any other, except perhaps the ♂ of the rare *pomorum*; but from that, its ♂ may be known at once by the shorter face, the form of the genital armature, and the narrow black band at the base of the 3rd segment of the abdomen. On the Continent a nearly black form occurs, var. *nigrescens*, Perez, but I have seen nothing of the kind from this country.

12. *Bombus Derhamellus*, Kirb. (Pl. XII., fig. 10).

Kirb., Mon. Ap. Angl., ii., p. 263; Smith, Cat. Brit. Hym., 2nd ed., p. 205.

Black, clothed with black pubescence; the 4th and following segments of the abdomen clothed with red; in the ♂ the thorax is banded with ochreous-grey hairs anteriorly and posteriorly in bright varieties, and the basal segments of the abdomen are also clothed with hairs of the same colour; but in dark varieties the band across the metathorax is wanting, and the base of the abdomen is black; posterior femora clothed with red hairs in both sexes.

♂. Head clothed with black hairs; cheeks longer than their apical width, shining, irregularly punctured. Antennæ with the 2nd joint of the flagellum considerably longer than the 3rd, the 4th as long as the 2nd and 3rd together, the following joints subarcuate. Thorax clothed with black hairs, with a band of paler hairs in front, and also behind in bright varieties; wings slightly dusky. Abdomen with brownish grey hairs on the two basal segments, with black on the 3rd, and with red on the remainder, or with the three basal segments entirely black; beneath clothed with reddish hairs; genital armature with the squama produced at the base inwardly into a long somewhat bent process; the lacinia produced at the base inwardly into a narrow spine, and sharply pointed at the apex (see Pl. XII., fig. 10). Legs clothed with reddish hairs.

♀ and ♂. Entirely clothed with black hairs, with the exception of the three apical segments of the body, which are bright red. Abdomen short and almost as wide as long; hairs of the posterior tibiæ red. Length, ♂ and ♀ 15—18 mm., ♀ 12—14 mm.

*Hab.* Generally distributed, and abundant in some localities.

The ♀ much resembles that sex of *lapidarius*, but the short abdomen and red hairs of the posterior tibiæ distinguish it at once.

13. *Bombus soroensis*, Fab. (Pl. XII., fig. 14).

Fab., Gen. Ins., p. 246; Smith, Cat. Brit. Hym., 2nd ed., p. 215 = *Cullumanus*, Kirby.

This species is probably the most variable of all in colour, and has led to great confusion on account of this peculiarity, as in some varieties the whole insect is

black, with the exception of the apex of the abdomen, which is whitish ; in others the thorax has a wide yellow band in front, the 2nd segment of the abdomen, and sometimes also the 1st, is yellow, the 3rd black ; the 4th and following segments white, or white with a narrow red line between the black and white, or red ; in the ♂ the apex of the abdomen is often clothed with almost pink hairs, which gives a most characteristic appearance. I will give here the structural and other characters by which this species can be known from its allies.

♂. This sex may be known from any other species by the shape of the genital armature, the sagittæ of which are curved outwards at the apex and thickened, with their apical margin truncate ; they are also bluntly toothed beneath near the middle ; the squama is long, sinuate on its inner margin ; the lacinia bidentate at the apex, the inner tooth longer and more curved (see Pl. XII., fig. 14). Besides these characters the white-tailed ♂ may be known from *terrestris* by having the 2nd joint of the flagellum shorter, it only being of the same length as the 3rd, whereas in *terrestris* it is nearly once and a half as long, by the longer cheeks and face, and by the longer more erect pubescence, and by the narrower more convex posterior tibiæ, which are destitute of any longitudinal impression ; from *pratorum* and *Derhamellus* the red-tailed ♂ may be known by the form of the genital armature, the larger size and more erect pubescence, and the shape of the posterior metatarsi, which are much more narrowed at the base, and the more arcuate joint of the antennæ.

♂ and ♀. May be known from *terrestris* by the longer face and cheeks, the latter being nearly as long as their apical width, by the less defined yellow abdominal band, which is of a less bright colour than in *terrestris* var. *lucorum*, and generally extends on to the basal segment, and also by the less compressed apical ventral segment ; the red-tailed varieties differ from *pratorum*, which they so much resemble, in the broader rather more squarely-shaped face, the shorter tongue and palpi, these latter hardly so long as the head, and the narrower black abdominal band, which occupies the 3rd segment only. Length, ♂ and ♀ 12–17 mm., ♀ 10–12 mm.

*Hab.* Rare. Croydon ; Southend ; Brighton Downs ; Bristol ; Carlisle ; Yorkshire ; Scotland.

14. *Bombus pomorum*, Panz. (Pl. XII., fig. 9).

Panz., Faun. Germ., 86, 18; Smith, Cat. Brit. Hym., 2nd ed., p. 206.

♂ greyish, with a darker band across the thorax; the abdomen reddish posteriorly; ♀ and ♂ black, with the abdomen black at the base, gradually shading into red at the apex, sometimes with the thorax pale in front and on the metathorax; the ♂ in continental specimens often fades to a greyish colour.

♂. Head clothed with black hairs; cheeks long, shining, impunctate, longer than the width of their apex. Antennæ with the 2nd joint of the flagellum longer than the 3rd, the 3rd a little more than half the length of the 4th. Thorax clothed with grey hairs, with a rather wide indefinite black band between the wings; wings slightly dusky. Abdomen clothed with grey hairs on the basal segment, with reddish hairs on the others, the hairs on the apex of each segment paler; segments beneath sparingly clothed with reddish hairs; genital armature with the sagittæ curved at the apex, much thickened and obliquely truncate, with a strong inferior tooth near the base; squama short, triangular, projecting at its internal angle; lacinia narrow, and somewhat twisted and apiculate (see Pl. XII., fig. 9). Legs clothed with black hairs, intermixed with finer reddish ones; sides of the metatarsi subparallel to their base.

♀ and ♂. Clothed with black hairs; head long, as in the ♂; the thorax in front and a band on the metathorax often more or less pale. Abdomen clothed with black hairs at the extreme base, gradually shading to red at the apex, the transition from one to the other being almost imperceptible; in the ♂ the base of the abdomen is sometimes reddish, sometimes grey; but this form has not yet been recorded from this country. Length, ♂ and ♀ 15—18 mm., ♂ 12—14 mm.

*Hab.* Very rare; the ♂ and ♀ only have occurred in this country, and we have only one locality recorded, viz., near Deal, where Mr. F. Smith captured three males in 1863 and his son a ♀ in 1864. I have a ♂ in my collection without note of locality.

15. *Bombus lapidarius*, Linn. (Pl. XII., figs. 8—8 a).

Linn., Syst. Nat., ed. x., i., p. 579; Smith, Cat. Brit. Hym., 2nd ed., p. 211.

Clothed with deep black hairs; the 4th and following segments bright red; ♂ with the face, a band across the thorax in front, the sides of the thorax beneath the wings, and a few hairs round the

posterior margin of the metathorax, yellow; the posterior tibiæ in this sex with red hairs, in the ♀ and ♂ with black; the ♀ and ♂ have rarely a pale anterior band on the thorax.

♂. Head clothed on the vertex with black hairs, and with yellow on the face; cheeks about as long as their apical width. Antennæ with the 2nd joint of the flagellum slightly longer than the 4th; the 3rd about two-thirds as long as the 2nd. Thorax clothed with black hairs, with a wide band of yellow hairs in front, which is continued under the wings and covers nearly the whole of the under side; there are also a few pale hairs generally on the metathorax. Abdomen clothed with black hairs; the sides of the segments sometimes more or less greyish; 4th and following segments clothed with bright red hairs; beneath coloured as above; genital armature with the sagittæ simple beneath, their apices each with a sharp hama on the inner side; squama rounded in front, projecting slightly on its inner margin at the base; lacinia flat, sinuate at the apex (see Pl. XII., fig. 8); posterior tibiæ clothed with red hairs.

♀ and ♂. Entirely clothed with deep black hairs, with the exception of the three bright red segments at the apex of the abdomen, and in some varieties of a pale anterior thoracic band. Length, ♂ and ♀ 14—20 mm., ♀ 12—15 mm.

*Hab.* Very common and widely distributed.

The only British species with which this can be confounded is *Derhamellus*, but the ♀ and ♂ of that species have the hairs of the posterior tibiæ red, and the abdomen shorter and more globose.

#### 16. *Bombus terrestris*, Linn. (Pl. XII., fig. 13).

Linn., *Syst. Nat.*, ed. x., p. 578 = *lucorum*, Smith, *Cat. Brit. Hym.*, pt. i., p. 225 = *virginialis*, Kirby, Smith, &c.

Head clothed with black hairs, or with the face yellow in var. *lucorum* of the ♂; thorax with black hairs, a band in front yellow, and often in the ♂ also with a band behind; in some extreme vars. of the ♂ the yellow is so extended as to leave only a narrow black band between the wings; abdomen with the basal segment black, 2nd yellow, 3rd and 4th black, the latter at the apex and the two apical segments white or tawny. In the ♂ the yellow hairs often cover the 1st and 2nd segments in var. *lucorum*, and there is sometimes a line of yellow hairs dividing the central black belt of the abdomen into two.

♂. Face short, the cheeks shorter than their apical width. Antennæ shorter than in most of the species, scarcely reaching

beyond the tegulæ; 2nd and 4th joints of the flagellum subequal; 3rd a little more than half as long as the 4th. Thorax with the pubescence coloured as above, the yellow varying from pale lemon-yellow, var. *lucorum*, to brownish yellow, var. *virginalis*. Wings only very slightly dusky. Abdomen variable in colour (see general description above), the yellow varying in depth and tint like that of the thorax; genital armature of the ♂ unlike that of any other species; the sagittæ slightly divergent, very deep and much flattened laterally; squama produced inwardly at right angles to the stipes; lacinia short, scarcely projecting beyond the squama (see Pl. XII., fig. 13). Legs clothed with pale hairs; posterior metatarsi narrowed towards the base.

♀ and ♂. With the pubescence coloured as stated in the general description, the tint of the yellow varying as in the ♂; cheeks short, shorter than their apical length; tongue reaching to about the base of the abdomen. Length, ♂ and ♀ 16–22 mm., ♀ 12–14 mm.

*Hab.* Very common and generally distributed.

There can be little doubt that the two forms which used to be considered distinct, viz., *lucorum* and *virginalis*, are only colour varieties of one species; there is no structural difference, and the genital armatures of the males agree exactly.

#### APIS, Linn.

Linn., Syst. Nat., ed. x., i., p. 574, 218.

Labial palpi 4-jointed; maxillary palpi 1-jointed; ♂ with the eyes approximate on the vertex; anterior wings with three submarginal cells; abdomen truncate at the base; ♂ with the anal opening inferior, and with the armature not polished and shining as in the other genera of the Aculeates, but of the same consistency as the other abdominal segments, the sagittæ lying apparently detached, and only obtainable by dissection.

Communities of males, female, and workers.

1. *Apis mellifica*, Linn. (Pl. XII., figs. 15—15 b).

Linn., Syst. Nat., ed. x., i., p. 576; Smith, Cat. Brit. Hym., 2nd ed., p. 226.

Brown, clothed with pale brown hairs; margins of the abdominal segments paler.

♂. Eyes meeting on the vertex; the pubescence of the thorax very dense. Abdomen broad and blunt at the apex (for genitalia see Pl. XII., figs. 15—15 b); tibiæ and metatarsi convex externally.

♀. Eyes remote on the vertex. Abdomen elongate, conical, pointed at the apex, longer than the wings; tibiæ and metatarsi subconvex externally, the former foveated just above the apex.

♂. Eyes remote on the vertex. Abdomen shorter than the wings, less conical than in the ♀; posterior tibiæ and metatarsi dilated and excavated externally, and clothed with long hairs at the edges, the metatarsi sharply dentate at the base. Length, 13—17 mm.

*Hab.* Common; the hive bee.

### EXPLANATION OF PLATES.

#### PLATE V.

FIG. 1. *Panurgus ursinus*, ♂ armature.

1 a.       "       "       7th ventral segment.

1 b.       "       "       8th       "       "

2.       "       *calcaratus*, ♂ armature.

2 a.       "       "       8th ventral segment.

3. *Rophites 5-spinosus*, ♂ armature.

3 a.       "       "       7th ventral segment.

3 b.       "       "       "       "       lateral view.

3 c.       "       "       8th ventral segment.

3 d.       "       "       "       "       lateral view.

4. *Dufourea vulgaris*, ♂ armature.

4 a.       "       "       7th ventral segment,

4 b.       "       "       8th       "       "

#### PLATE VI.

1. *Nomada Roberjeotiana*, ♂ armature.

1 a, 1 b.   "       "       8th ventral segment, ventral and lateral views.

2.       "       *solidaginis*, ♂ armature.

2 a, 2 b.   "       "       8th ventral segment, ventral and lateral views.

3.       "       *varia*, ♂ armature.

3 a, 3 b.   "       "       8th ventral segment, ventral and lateral views.

4.       "       *6-fasciata*, ♂ armature.

4 a, 4 b.   "       "       8th ventral segment, ventral and lateral views.

5.       "       *lincola*, ♂ armature.

5 a, 5 b.   "       "       8th ventral segment, ventral and lateral views.



FIG. 6. *Nomada alternata*, ♂ armature.

- 6 a, 6 b. " " 8th ventral segment, ventral and lateral views.
7. " *alboguttata*, ♂ armature.
- 7 a, 7 b. " " 8th ventral segment, ventral and lateral views.
8. " *jacobææ*, ♂ armature.
- 8 a, 8 b. " " 8th ventral segment, ventral and lateral views.
9. " *succincta*, ♂ armature.
- 9 a, 9 b. " " 8th ventral segment, ventral and lateral views.
10. " *lateralis*, ♂ armature.
- 10 a, 10 b. " " 8th ventral segment, ventral and lateral views.
11. " *ochrostoma*, ♂ armature.
- 11 a, 11 b. " " 8th ventral segment, ventral and lateral views.

PLATE VII.

1. *Nomada Fabriciana*, ♂ armature.
- 1 a, 1 b. " " 8th ventral segment, ventral and lateral views.
2. " *ruficornis*, ♂ armature.
- 2 a, 2 b. " " 8th ventral segment, ventral and lateral views.
3. " *furva*, ♂ armature.
- 3 a, 3 b. " " 8th ventral segment, ventral and lateral views.
4. " *flavoguttata*, ♂ armature.
- 4 a, 4 b. " " 8th ventral segment, ventral and lateral views.
5. " *Lathburiana*, ♂ armature.
- 5 a, 5 b. " " 8th ventral segment, ventral and lateral views.
6. " *ferruginata*, ♂ armature.
- 6 a, 6 b. " " 8th ventral segment, ventral and lateral views.
7. " *bifida*, ♂ armature.
- 7 a, 7 b. " " 8th ventral segment, ventral and lateral views.
8. " *obtusifrons*, ♂ armature.
9. *Epcolus rufipes*, ♂ armature.
- 9 a, 9 b. " " 7th dorsal and 8th ventral segment.
- 1 " " *productus*, ♂ armature.
- 10 a. " " 7th ventral segment.

## PLATE VIII.

- FIG. 1. *Melecta armata*, ♂ armature.  
 1 a. " " 7th ventral segment.  
 1 b. " " 8th " "  
 2. " *luctuosa*, ♂ armature.  
 2 a. " " 7th ventral segment.  
 2 b. " " 8th " "  
 3. *Calioxys rufescens*, ♂ armature.  
 4. " *4-dentata* "  
 5. " *acuminata* "  
 6. " *elongata* "  
 7. " *vectis* "  
 8. *Osmia xanthomelana* "  
 9. " *rufa* "  
 10. " *aurulenta* "  
 11. " *parietina* "  
 12. " *spinulosa*, ♂ armature, showing 8th ventral segment beneath.  
 13. " *caruleseens*, ♂ armature.  
 14. " *bicolor* "  
 15. " *fulviventris* "  
 16. " *leucomelana* "

## PLATE IX.

1. *Megachile Willughbiella*, ♂ armature.  
 1 a. " " 6th ventral segment, and much enlarged spines of do.  
 2. " *maritima*, ♂ armature.  
 2 a. " " 6th ventral segment, and much enlarged spines of do.  
 2 b. " " 8th ventral segment.  
 3. " *ligniseca*, ♂ armature.  
 3 a. " " 6th ventral segment, and much enlarged spines of do.  
 4. " *circumcincta*, ♂ armature.  
 4 a. " " 6th ventral segment, and much enlarged spines of do.  
 5. " *centuncularis*, ♂ armature.  
 5 a. " " 6th ventral segment, and much enlarged spines of do.  
 6. " sp. ?,\* ♂ armature.  
 6 a. " " 6th ventral segment, and much enlarged spines of do.

\* I figured this from a continental specimen ticketed *pyrina* in F. Smith's collection, but I have now reason to think that it does not represent true *erictorum*.

FIG. 7. *Megachile argentata*, ♂ armature.

7a. " " 6th ventral segment, and much enlarged spines of do.

## PLATE X.

1. *Heriades truncorum*, ♂ armature.
- 1a. " " 5th ventral segment.
2. *Stelis aterrima*, ♂ armature.
3. *Anthidium manicatum*, ♂ armature.
- 3a. " " 8th ventral segment.
4. *Chelostoma florissomne*, ♂ armature.
- 4a. " " 5th ventral segment.
5. " *campanularum*, ♂ armature.
- 5a. " " 7th ventral segment.
- 5b. " " 8th "
6. *Eucera longicornis*, ♂ armature.
- 6a. " " 7th ventral segment.
- 6b. " " 8th "
7. *Anthophora retusa*, ♂ armature.
- 7a. " " 7th ventral segment.
- 7b. " " 8th "
8. " *pilipes*, ♂ armature.
- 8a. " " 7th ventral segment.
- 8b. " " 8th "

## PLATE XI.

1. *Saropoda bimaculata*, ♂ armature.
- 1a. " " 7th ventral segment.
- 1b. " " 8th "
2. *Anthophora furcata*, ♂ armature.
- 2a. " " 7th ventral segment.
- 2b. " " 8th "
3. " *quadrifaculata*, ♂ armature.
- 3a. " " 7th ventral segment.
- 3b. " " 8th "
4. *Osmia pilicornis*, ♂ armature.
5. *Ceratina cyanea*, "
- 5a. " " 6th ventral segment.
6. *Psithyrus Barbutellus*, ♂ armature.
- 6a. " " 7th ventral segment.
- 6b. " " 8th "
7. " *vestalis*, ♂ armature.
8. " *rupestris*, ♂ armature, 8th ventral segment showing beneath.

## PLATE XII.

- FIG. 1. *Psithyrus campestris*, ♂ armature.  
 1 a. " " 7th ventral segment.  
 1 b. " " 8th "
 2. " *quadricolor*, ♂ armature.  
 3. *Bombus Smithianus* "  
 4. " *cognatus* "  
 4 a. " " 8th ventral segment.  
 5. " *pratorum*, ♂ armature.  
 5 a. " " apex of sagittæ.  
 5 b. " " 7th and 8th ventral segments.  
 6. " *hortorum*, ♂ armature.  
 7. " *muscorum* "  
 8. " *lapidarius* "  
 8 a. " " apex of sagittæ.  
 9. " *pomorum*, ♂ armature.  
 10. " *Derhamellus* "  
 11. " *sylvarum* "  
 12. " *Latreillellus* "  
 12 a. " " 7th ventral segment.  
 12 b. " " 8th "  
 13. " *terrestris*, ♂ armature.  
 14. " *soroensis* "  
 15. *Apis mellifica*, ♂ armature.  
 15 a. " " sagittæ.  
 15 b. " " " laterally.